

EDITORS:

Poul Bonnevie
Ugeskrift for Læger

Mogens Fog
Ugeskrift for Læger

H. C. A. Lassen
University of Copenhagen

Niels Blixenkron-Møller
University of Aarhus

Richard Friedberg
National Health Service

Assistant Editor: Fritz Fuchs

MENTAL HEALTH SERVICE PLANNING IN DENMARK

By ERIK STRÖMGREN

INTRODUCTION

On March 29th, 1952, the Danish Ministry of Internal Affairs appointed a commission to consider the State Mental Health Service.

In Denmark all mental hospitals are administered by the state with the exception of St. Hans Hospital, which serves exclusively the City of Copenhagen, and "Kolonien Filadelfia", which is a private institution. The state hospitals serve a population of about 3½ million.

According to its terms of reference the commission was to "report on trends in development of the State Mental Health Service in respect of organization and buildings, with special reference to the necessary adaptation of the hospitals to present-day needs and forms of treatment. The commission's deliberations, which should principally be concerned with the modernizing and extension of the hospitals together with their position in relation to the general hospital service, should also include the possible extension of treatment to categories of patients with mental disorders other than true insanity. The commission's work should be so arranged that its report could constitute the immediate foundation for the practical organization of future reform work".

Due to various circumstances the commission made a preliminary report as early as December 1952. On the basis of this report an act was passed in March 1953 authorizing a series of extensions and modernizations of the psychiatric hospitals, and accordingly this became the first stage of the reorganization programme with which the commission was concerned.

The final report, a book of about 200 pages, was published by the commission in November 1956. While part of the report is only of interest to Danish psychiatrists, other parts contain theo-

retical discussions and practical data which may be of more general interest to anybody working in psychiatric or other health services. The following is a summary of the report with special emphasis on those points that may have a wider significance.

At the time when the commission was appointed, the situation was as follows: While the development of the Mental Health Service had previously, to a certain degree, kept pace with that of the General Hospital Service, the last generation had witnessed a regrettable stagnation of the psychiatric hospitals, which was the more conspicuous in view of the rapid development of the general hospitals during that period. It had also become evident that recently developed therapeutic procedures could not be fully exploited in the existing psychiatric hospitals with their insufficient and antiquated facilities and that far too much of the medical and nursing staffs' energy and initiative, which should have been used to better purpose, was being wasted on problems due to the ever-increasing overcrowding of the hospitals. These unsatisfactory conditions had, with increasing frequency, been the subject of public discussions in latter years, and the appointment of the commission therefore seemed to fulfil a widespread wish in the population.

The State Mental Health Service has at its disposal 7 psychiatric hospitals, here named according to their localization: Aarhus (which was opened in 1852), Vordingborg (1858), Viborg (1877), Middelfart (1888), Nykøbing Sjælland (1915), Vedsted (1921), and Augustenborg (1932). The Aarhus, Vordingborg, Middelfart, and Nykøbing Sjælland hospitals were built for the purpose, while Viborg hospital was established in an old prison, Vedsted hospital in an abandoned railway station, and Augustenborg in a ducal palace. All the hospitals have had wings and annexes added in the course of time, several have auxiliary institutions in the form of nursing homes, and they all have a number of patients placed in supervised family care.

From the Danish State Mental Health Service,
Director: Professor L. le Maire,
and Aarhus University, Department of Psychiatry,
Professor E. Strömberg.

Table 1.
Average daily number of patients under treatment in the year April 1, 1950, to April 1, 1951.

	Population of the district	In the hospital		Nursing homes		Family care		Total	
		Patients	per 1000	Patients	per 1000	Patients	per 1000	Patients	per 1000
Aarhus	732,182	829	1.13	250	0.34	370	0.51	1,449	1.98
Vordingborg	551,303	857	1.56	447	0.81	117	0.21	1,421	2.58
Viborg	600,235	1,032	1.72	202	0.34	124	0.21	1,358	2.26
Middelfart	567,445	1,046	1.84	123	0.22	99	0.18	1,268	2.23
Nykøbing	657,187	971	1.48	220	0.33	117	0.18	1,308	1.99
Vedsted	149,752	244	1.63	0		51	0.34	295	1.97
Augustenborg	255,066	482	1.89	0		39	0.15	521	2.04
Total	3,513,170	5,461	1.55	1,242	0.35	917	0.26	7,620	2.17

Table 1 shows the number of occupied beds in 1950. Each hospital, with attached nursing homes and supervised family care, serves a certain region, and the table shows the number of beds available per 1,000 inhabitants in each region. For the country as a whole 2.17 beds were available per 1,000 inhabitants in 1950, and those familiar with psychiatric statistics will observe how small this figure is; in countries which are culturally and geographically closely related to Denmark the corresponding figures are considerably higher, usually around 4—6 beds per 1,000 inhabitants. Since the demand for psychiatric beds can hardly be very much lower in Denmark, it is obvious that the development of the psychiatric hospital service has been sadly neglected in this country. One must furthermore note that the number of patients in each hospital is considerably higher than that for which it was originally built.

It had of course been known for a long time that the hospitals were overcrowded and the facilities obsolete, and several committee reports had been published. On the basis of one of these reports an act was passed in 1947 authorizing the building of a new psychiatric hospital in Brønderslev, a re-building of the Viborg hospital, and an extension of the Aarhus hospital, including plans for a child psychiatric ward. However, this act was never carried into effect, partly due to financial difficulties and perhaps partly due to the fact that the placing of the Brønderslev hospital was severely criticized by the psychiatrists. They pointed out that new psychiatric hospitals should preferably be placed in close proximity to the large regional general hospitals in which the other clinical fields are represented; in Brønderslev the new hospital would be situated two miles from the nearest general hospital, which, in addition, was only a small one.

It appeared from this discussion, which attracted much public attention, that the plans outlined by the previous committees were not in accord with recent psychiatric developments, and in 1948 the National Health Service appointed a new committee which should discuss thoroughly and as a whole the future organization of the Men-

tal Health Service. The report published by the committee in 1952 served in many ways as a natural starting point for the discussions in the Commission of 1952.

While the Committee of 1948 was made up of psychiatrists only, the 1952-Commission had a much broader basis and included, in addition to psychiatrists, representatives of other clinical fields, general practitioners, politicians, representatives of the Ministry of Internal Affairs, of the General Hospital Service, and of the various categories of personnel in the Mental Health Service. In view of the many different interests represented on the commission it seems remarkable and encouraging that unanimous support was obtained for its very comprehensive report. It is also worthy of note that there is a very good agreement between the main ideas in this report and the conclusions reached by the Psychiatric Committee of 1948.

Throughout its work the commission had to balance the following two considerations: On the one hand, the psychiatric hospital service was in a critical situation, which had to be relieved as soon as possible; on the other hand, a main objective for the commission was to make the plans sufficiently broad and general so that they could serve as a guide for the reorganization and development of the psychiatric hospital service for at least a few decades.

It was evident from the outset that a satisfactory solution could not be reached in less than at least 15—20 years, but during this period the hospitals should still be capable of functioning, and certain immediate measures were accordingly required. The commission, therefore, had to plan the emergency measures in such a way that they could be fitted into the more general long-term programme.

The most important practical example of this double task may be mentioned. The members of the commission soon agreed that the psychiatric hospitals should be closely united with the general hospitals, and new psychiatric hospitals should therefore, when it was at all possible, be placed in close proximity to the large regional general

hospitals. On the other hand, most of the existing psychiatric hospitals were situated rather a long way from the general hospitals, and since, furthermore, the old hospitals were often not very well suited for their purpose, it was a tempting idea to abolish the existing hospitals and concentrate the forces on a rapid building of new psychiatric hospitals close to the general hospitals. However, considerations of both time and money at once made it clear that this ideal plan could not be realized; for at least several years it would be necessary to use the existing hospitals to a large extent because their beds could not be dispensed with. This would involve the spending of considerable sums on modernizations which, after all, would not lead to ideal conditions. The ideal plan had to be modified by inevitable practical considerations, however, and here, as elsewhere, the provisional and the final objectives had to be balanced against one another, though preferably in such a way that they were brought in the closest possible harmony.

STATISTICAL REPORT

The most urgent need was obviously for relief of the very heavy overcrowding of the hospitals. In order to achieve this in the most rational way, an estimate was required of the present and future needs for psychiatric beds, both in the country as a whole and in the various regions. In its first meeting, the commission appointed a statistical committee to deal with these questions. This committee, which received valuable help from the Department of Statistics of the Ministry of Finance and from the Department of Medical Statistics of the National Health Service, made a report in the spring of 1954, and on the basis of this report the commission drew up a 20-year plan for the building of new hospitals and the modernizing of old ones.

The statistical report starts by pointing out that the factors influencing the demand for psychiatric beds may be divided into three main groups: A) population factors, B) the frequency of mental illnesses and aberrations (*i. e.*, the morbidity), and C) hospital factors (nosocomial factors).

The significance of the *population factors* is obvious. The need for psychiatric beds must depend on the total population figures as well as on the age distribution in the population, because the incidence of mental disorders varies considerably among the different age groups. The relative sizes of the rural and urban populations are also of significance, because the mentally abnormal are more easily taken care of in private homes in the country than in the cities.

In contrast, the *morbidity* — at least of the most common mental diseases — seems to be remarkably constant, not only from one country to another, but also during the whole period for which reliable statistics are available. There is nothing to indicate that the risk of acquiring, *e. g.*, schizophrenia, manic-depressive psychosis or senile psychosis has changed during this period. The view that psychiatric morbidity

is increasing seems to be commonly held among the lay-public — and also among doctors; this misconception may be due to various factors: nowadays psychiatric patients go to a doctor more readily than before; the proper care of the psychiatric patients in private homes cannot be practised as often now as formerly; and, finally and perhaps most important, the age distribution in the population has changed in a direction which is unfavourable to the ratio of healthy to sick persons.

Among the *hospital factors* may be mentioned the following: If there are few hospitals in the area and consequently long distances between the patients' homes and the hospital, the admission rate will be relatively low; this will also be the case if the hospitals are overcrowded, the provisioning poor and the care insufficient. Any improvement of the hospital service must accordingly result in an increased demand for beds. Furthermore, if a hospital serves an extensive area, out-patient treatment is less feasible, and many patients are therefore admitted to the hospital who might under different conditions have been treated in an out-patient clinic. For patients who live close to the hospital qualitative factors usually determine whether they are admitted or whether they prefer out-patient treatment; overcrowding and bad facilities in the hospital lower the admission rate and increase the extent to which out-patient treatment is used.

A statistical evaluation of some of these factors is of course difficult; but in the case of others their present significance and future development can be estimated with relative certainty.

A. Population Factors.

In order to evaluate the effect of these factors, the number of psychiatric beds regarded as necessary for a given population must be decided, and this decision is of course to some extent arbitrary. In 1950 the State Mental Health Service had at its disposal 2.17 beds per 1,000 inhabitants. This figure was decidedly too low, and it was actually lower than it had been at other times. The highest figure, 2.40 per 1,000, was found in 1940, and even this must be considered too low. At that time it was proposed to raise the figure to 2.50 per 1,000, and the statistical committee, in adopting this figure, realized fully that it was an absolute minimum.

During the period from 1940 to 1950 the increase in the number of beds did not keep up with the increase of the population; 800 new beds, corresponding to 0.23 per 1,000 in a population of 3.5 million, would have been required in order to raise the 1950-figure to that found in 1940, and an additional 350 new beds to raise the figure to 2.50 per 1,000.

The population outside Copenhagen is increasing by about 35,000 per year, corresponding to the yearly provision of 90 new psychiatric beds, so that one can calculate as follows: With the expected increase of the population 10,800 beds would be required in 1970. In 1950 7,400 beds were available, and since the modernizing of the old hospitals would lower their capacity by 1,800

beds, about 5,200 new beds must be provided in order to reach a figure of 2.50 per 1,000 in 1970.

As regards the geographical distribution one must note that in Denmark the population increase is particularly rapid near the capital. In the City of Copenhagen itself there is very little room for new housing, and the population is stagnating. The large population increase occurs primarily in the suburbs, and this has led to particularly heavy overcrowding of the Nykøbing Sjælland hospital, because its region includes these suburban communities.

So far it has been taken for granted that the need for psychiatric beds per 1,000 inhabitants would remain rather constant also in the future; but this assumption is almost certainly not correct. Increasing urbanization may be mentioned as one factor of importance. We do not know whether the stress of urban life is greater nor whether it promotes mental disease more easily than does rural life, but it is at least certain that the mentally ill manage more easily without hospitalization in rural communities than in the cities.

This is observed in other countries and also in Denmark, where we find that in 1950 3.2 per 1,000 in the City of Copenhagen were in psychiatric hospitals, compared to 2.2 per 1,000 outside Copenhagen. In this respect there is apparently less difference between small and large cities than between urban communities and rural communities, as shown most clearly by Landis & Page (1938). According to these authors, the curve of admissions to psychiatric hospitals shows a sharp rise for communities exceeding 2,500 inhabitants. If we similarly divide the Danish population (outside the City of Copenhagen) into rural and urban communities, we find in 1950 almost equal numbers of inhabitants in the two groups, but if the trend of the last generation continues, the urban population will amount to about 60 per cent in 1970.

The need for hospital beds will, in all probability, be accentuated by this development. The progressive ageing of the population is another highly significant factor. It is a general experience that the percentage of old persons in the psychiatric hospitals rises steadily; while in 1937 less than 20 per cent of the patients in Danish psychiatric hospitals were 60 years or above, no less than 35 per cent belonged to this age group in 1952.

It would be natural to assume that this increase was entirely due to patients suffering from psychoses due to old age being more frequently admitted to the psychiatric hospitals. This is undoubtedly so in the psychiatric clinics in the large cities, where an increasing percentage of those admitted are old; but in the psychiatric hospitals outside the capital other factors may also play a role. At the Aarhus hospital a study was made of the distribution of the admissions between the various age groups (table 2), and it appeared

Table 2.
Admissions to the Aarhus Psychiatric Hospital.

Year	All admissions	60 years and over	
		admissions	per cent
1910	104	12	11.5
1915	142	13	9.2
1921	233	30	12.9
1925	221	21	9.5
1930	266	26	9.8
1935	252	28	11.1
1940	359	53	14.8
1945	515	69	13.4
1950	619	52	8.4

that persons of 60 years or above made up a fairly constant proportion, 10–12 per cent of those admitted, with no tendency to increase during the last few decades. The increasing number of old persons in the hospital was consequently not due to a higher admission rate in this age group but must be explained by a fall in the death-rate of the chronic patients. In accordance with this it was found that most of the elderly patients in the Aarhus hospital did not primarily suffer from psychoses due to ageing, but were mainly schizophrenics who had been admitted years ago. In this connection it may be mentioned that in 1937 the proportion of patients in all the State psychiatric hospitals who had been there more than 10 years was 35 per cent, whereas in 1952 it had risen to no less than 51 per cent.

Table 3.
Age-distribution of patients resident in Danish psychiatric State hospitals.

Age	Number of patients per 100,000 inhabitants in			
	1937	1942	1947	1952
—15	1			1
15—19	19	22	21	30
20—24	88	72	60	66
25—29	165	136	107	91
30—34	264	212	171	161
35—39	372	326	233	235
40—44	425	378	321	298
45—49	471	448	416	376
50—54	445	507	458	515
55—59	436	511	462	562
60—64	405	509	480	578
65—69	382	427	441	566
70—74	352	425	432	575
75—79	302	389	450	613
80—	210	335	395	669
Total	205	213	196	219

Table 3 gives a detailed survey of the age distribution in the State psychiatric hospitals in 1952. The corresponding figures from 1937, 1942, and 1947 are also presented. The figures show clearly to what extent the older age groups are replacing

the younger, and the explanation is thus not only the increasing number of old persons in the population, but also that the incidence of hospitalization, at any given time, has risen in this group. It is in this connection worthy of note that the incidence of hospitalization among the younger persons has shown a decrease. Since we cannot assume that the morbidity in this latter age group has fallen, one might seek the explanation of this phenomenon in a more effective treatment of the diseases from which the younger persons suffer. It is, on the other hand, to be feared that the decreased number of patients in these age groups is to a very large extent due to the increasing overcrowding of the hospitals. In that case there must be a latent need for hospitalization in these groups, a need which will become manifest as soon as more beds are made available.

B. Morbidity.

Both in Denmark and in other countries quite thorough studies have been made of the expectancy of the various mental diseases. They show remarkably constant expectancies from one country to another. Almost all systematic studies of relatively large populations have shown that 10–12 per cent of the population will, at least once in their life, suffer from a psychiatric disease. The 4 main categories of mental abnormality (according to Danish terminology), *viz.* psychoses, mental deficiency, neuroses, and psychopathies, are almost equally represented in this figure.

But even if the expectancy of the main psychiatric disorders cannot be expected to change significantly in the future, it seems certain that the demands on the health service will increase, due to the effect of a variety of factors. The question is now whether opposing tendencies also become manifest; one might consider, for example, the possibility that new preventive or therapeutic procedures might lower the incidence of mental diseases or shorten the time of hospitalization. Such tendencies may, in fact, be demonstrated for individual diseases, and in some quarters an appreciable decrease of the demand for psychiatric beds has been predicted. In order to analyse the foundations of this belief, a "cross-section study" was made at the Aarhus hospital in January, 1953.

All patients staying at the hospital on a certain date were recorded, and tables were made containing data on sex, age, diagnosis (table 4), and type of ward; factors which might influence the prognosis were also noted, *e.g.*, whether the patients suffered from complicating disease that would hamper or prevent an effective treatment, whether all therapeutic possibilities had been exhausted, and so on. The main object of this study was to find out in how many cases an improvement of the care and treatment could be expected to lead to an earlier discharge.

Of the more important psychoses, *general paralysis* has probably been subject to more changes in frequency and therapeutic procedures than any other during the last few generations. Previously, the disease almost invariably ran a fatal course within a few years, but the prognosis was radically improved with the introduction of fever therapy. There was, however, no corresponding decrease in the demand for psychiatric beds, the reason being that a certain number of patients benefitted from the treatment to such an extent that their lives were prolonged, the improvement not being sufficient, on the other hand, to permit discharge from hospital; as a result they now spend more years in hospital than previously. The modern penicillin-prophylaxis has apparently lowered the incidence of fresh cases of general paralysis, but recent reports indicate an increasing frequency in some parts of Europe, and it is, on the whole, difficult to make any predictions about future developments. At any rate, the frequency of this disease has been so low in this country during the last few decades that even large changes in the morbidity and the duration of hospitalization can play only a minor role quantitatively.

Psychoses due to old age were found in seven per cent of the patients, and everything indicates that this figure will rise in the future. An effective therapy of these diseases is not available, but the more effective treatment of intercurrent physical disease has led to a fall in the mortality and a corresponding prolongation of hospitalization.

The other organic psychoses occurred with insignificant frequency.

As might be expected, *schizophrenia* constituted by far the largest group. A scrutiny of the more than 400 cases of schizophrenia shows that, with only a few exceptions, they had been treated by all available means; this group must consequently be made up of those cases who had not responded to treatment or who had not responded well enough to be discharged. — It must be noted that the "cross-section study" was carried out before the introduction of the modern drug therapies. It is therefore conceivable that the group of schizophrenics has been much reduced since then; unfortunately, this does not seem to be the case, and the overcrowding of the hospital is worse than ever. (The above statement concerning the unchanged frequency of schizophrenia in the hospital is based only on a general impression, and a detailed quantitative analysis might lead to a different result. A new "cross-section study", including all Danish psychiatric hospitals, is taking place at the present moment and may yield information on this point.)

Patients suffering from *manic-depressive psychosis* constituted the second largest group (18 per cent). (It should be noted here that the frequency of this disease is possibly rather high in Denmark and also that this diagnosis is possibly made more often in the Aarhus hospital than elsewhere in Denmark.) It was found that about half of the patients in this group had shown relatively little response to shock treatment, usually so effective against this disease. The possibility cannot be excluded that in these cases also the effectiveness of treatment may be improved, but even so we must count on having a certain number of beds occupied by manic-depressives who are resistant to all types of treatment. The remaining cases in this group were patients with a benign psychosis and with a good chance of benefitting from shock

Table 4.
Distribution of patients resident in the Aarhus Psychiatric Hospital on January 28, 1953, according to age, sex, and diagnosis.

Age	G. P. I. M. F.	Senile M. F.	Epilepsy M. F.	Other organic M. F.	Schizo- phrenia M. F.	Man- depr. M. F.	Reactive psychosis M. F.	Neurosis M. F.	Psycho- pathy M. F.	Alcoholism M. F.	Drug addict. M. F.	Forensic exam. M. F.	Mental defic. M. F.	Total M. F.			
10-14														1	1	2	
15-19					3	1	2	3						1	6	9	
20-24					11	3	1	3	2	1	1			1	16	10	
25-29					11	8	1	1	3	1	1			3	20	15	
30-34			1		18	12	2	3	1	3	1			2	32	23	
35-39			2	2	26	23	4	5	2	5	3			3	42	41	
40-44			4	4	22	25	12	9	3	7				2	52	47	
45-49	2		2	1	38	27	7	6	3	4				1	59	46	
50-54	2	1			35	32	8	7	3	3	1			3	52	52	
55-59	5	3		1	21	28	7	13	1	1				1	41	53	
60-64	7	1			24	25	6	15			2			1	40	47	
65-69	1	1		1	6	16	7	13						1	19	34	
70-74					4	7	7	7						2	21	21	
75-79					2	1	2								6	10	
80-84					1	2									8	5	
85-89															4	3	
90-94					1										0	1	
Total M+F	17 22	5 58	32 26	9 11	11 16	222 211	64 87	151	19 29	4 12	14 22	11 0	5 2	4 0	7 17	419 418	837
Per cent.	4.1 2.6	1.2 6.9	7.6 6.2	2.1 1.3	2.6 1.9	53.0 50.5	15.3 20.8	4.5 6.9	10 2.9	1.9	3.3 5.3	2.6 0.0	1.2 0.5	1.0 0.0	1.7 4.1	100.0 100.1	99.8

treatment. While in these cases the average duration of the psychotic phase had previously been around 6 months, shock treatment has reduced it to 2-3 months, and therapeutic techniques will probably be further improved with a consequent shortening of the time these patients have to stay in hospital. But on the other hand, we are here dealing with a disease that previously had a considerable mortality, mainly due to suicides, and one result of the greater therapeutic effectiveness is that these patients will live longer and will therefore have more psychotic attacks; in many cases the total stay in hospital may thus be longer than if the patients had received no treatment. All in all, it is particularly difficult to make any long-term prediction about the frequency of this disease; it does not appear unreasonable to hope that it may prove specially responsive to future drug therapies and that eventually we shall be able to check most cases of this very common disease.

Reactive psychoses constituted a rather large group. Usually these psychoses show a good spontaneous prognosis, but treatment may frequently shorten the duration of the psychotic phases or reduce the risk of relapse. It seems possible therefore that further development of therapeutic procedures may lead to a diminished demand for psychiatric beds for these patients.

The *neuroses* are quantitatively of little significance, mainly due, no doubt, to the overcrowding of the hospitals. With more beds available, more neurotics will undoubtedly be admitted; similar considerations are valid for the group of *psychopathies*.

While *alcohol addicts* present a major problem in the psychiatric clinics in the large cities, they occupy only few beds in the psychiatric hospitals outside Copenhagen. The recent intensification of the out-patient treatment of these patients will presumably further reduce their hospitalization; but one must also take into account that patients who formerly shirked treatment have been induced to cooperate by the introduction of more effective therapies.

Drug addicts are quantitatively of no significance.

Only a few patients with *mental deficiency* are found in the Danish psychiatric hospitals. They are normally taken care of in special institutions and only go to a psychiatric hospital if they also suffer from chronic or frequently recurring psychoses.

To summarize, the study seems to show clearly that as regards the disease groups which represent the largest number of patients there is very little prospect of a lowered demand for psychiatric beds in the near future, even when the expected advances in therapy are taken into consideration. In the largest group, the *schizophrenics*, which represents half of the patients in the hospital, the excess mortality is steadily decreasing; this is so also for the *senile patients*, and these two groups must therefore be expected to occupy an increasing number of beds. Only in the cases of *general paralysis* and *reactive psychosis* may a decreased demand for beds be reasonably expected in the near future, but together they represent only 8-9 per cent of the patients in the present material, which can be taken as fairly representative of the Danish psychiatric hospitals. We cannot expect, therefore, that the diminu-

tion of these groups will be able to compensate for the increased demand which may be predicted for other groups.

This rather pessimistic evaluation may seem astonishing at a time when psychiatric therapy is undergoing important developments. It must be remembered, however, that not only in psychiatry, but also in other medical fields, an increased therapeutic effectiveness leads first and foremost to a resocialization and a revalidation of the sick. This relieves society of a burden, but not the hospitals, because patients who formerly had nothing to gain from admission now flock to the hospitals to be treated with the new drugs or other therapeutic procedures. It would therefore be unreasonable to expect psychiatric therapy, however much it may advance in the next ten years, to decrease the demand for psychiatric hospital beds.

C. Hospital Factors.

Most of these can obviously be evaluated qualitatively, but it is difficult to make any quantitative predictions about them.

As mentioned above, it seems certain that if the psychiatric hospitals are equipped with more beds and provide better care and treatment, the need for beds will rise. This will be so also if one considers building a greater number of smaller hospitals spread over the country, so that the average distance to the hospitals is reduced. Both old and new Danish statistics show a higher frequency of admission in regions adjacent to the hospital than in those at a distance from it.

The efficiency of the medical work exerts of course a significant influence on the time each patient has to stay in the hospital. If the hospital is well equipped with doctors, ancillary personnel (secretaries, social workers, laboratory assistants, etc.) and instruments, it will be possible to carry out examinations and treatment in the most expedient way. With the present staffs and facilities a much too large part of the patients' time is wasted in waiting, either before or after admission; this has extremely unfortunate consequences, not only directly on the well-being of the individual patient, but also on the reputation of the hospitals and thereby on the attitude of patients towards psychiatric treatment.

From the statistical studies and considerations presented above one may draw the conclusion that the increase of the population is the only significant factor that may be quantitatively predicted. It may be said with certainty that a number of further factors will lead to an increased demand for beds, but the magnitude of this increase cannot be predicted accurately. Other factors will quite probably have the opposite effect.

In these circumstances it seems, on the whole, to be most correct to base the building programme of the State Mental Health Service on calculations

from the increase of population. The factors leading to an increased demand will, in all probability, be stronger than the opposing ones, but this is not so certain that it must necessarily be taken into account in the practical planning. In view of this uncertainty it is, however, advantageous if the building programme can be made flexible, and this is obtained most easily by operating with small units. As mentioned previously, this tendency offers advantages also from other points of view.

A special problem, which must also be considered in the building programme, is presented by the *distribution of patients among the various categories of "beds"*. The State Mental Health Service places patients in hospitals, in nursing homes, and in supervised family care. All three categories are desirable, but the most advantageous distribution between them is less certain. It may be noted here that the Danish nursing homes house mild chronic cases, mostly schizophrenics and senile patients, who no longer need to be actually in hospital.

In 1950, as mentioned above, the State Mental Health Service had at its disposal a number of beds (including extra beds due to overcrowding) corresponding to 2.17 per 1,000 inhabitants. They were distributed with 1.55 per 1,000 in hospitals, 0.35 per 1,000 in nursing homes, and 0.26 per 1,000 in supervised family care. But the distribution varied considerably between the various parts of the country, primarily because some of the hospitals did not have any associated nursing homes. If we consider only the regions where all three categories were available, we find that 70 per cent of the patients were in hospital, 18 per cent in nursing homes, and 12 per cent in supervised family care. A reduction in the number of private homes willing to accommodate patients seems probable in the future, and since the patients concerned might as well be placed in nursing homes, it seems reasonable to count on 70 per cent of the patients being in hospitals and 30 per cent in nursing homes and family care. The placing of such a large number of patients outside hospitals has, however, become less desirable in recent years, because the application of modern methods of treatment is more difficult under these conditions. This is supported by the fact that many patients, who were formerly considered unresponsive to treatment and who could therefore be placed in a nursing home, would now appear to have a chance of benefitting from active treatment. It would in any case be advantageous if the nursing homes were to be placed not too far away from their controlling hospital, so that efficient treatment might be carried out in cooperation with the hospital.

THE COMMISSION'S RECOMMENDATIONS

On the basis of the report made by the statistical

committee and with due consideration of the utility of the existing psychiatric institutions the Commission worked out a detailed plan for the development of the State Mental Health Service until 1957 (see map on page 9). In short, it is proposed that 6 of the existing hospitals be thoroughly modernized, that one of them (Vedsted) be converted into a nursing home, and that 12 new hospitals (including one in the Faroe Islands) and 7 new nursing homes be built.

These propositions include the projects which are already under realization according to the Act of March 1953, namely: building of new hospitals in Brønderslev, Glostrup, and Aalborg, of nursing homes in Viborg and Ballerup, of a child psychiatric unit in connection with the Aarhus hospital, and modernization of the Viborg hospital.

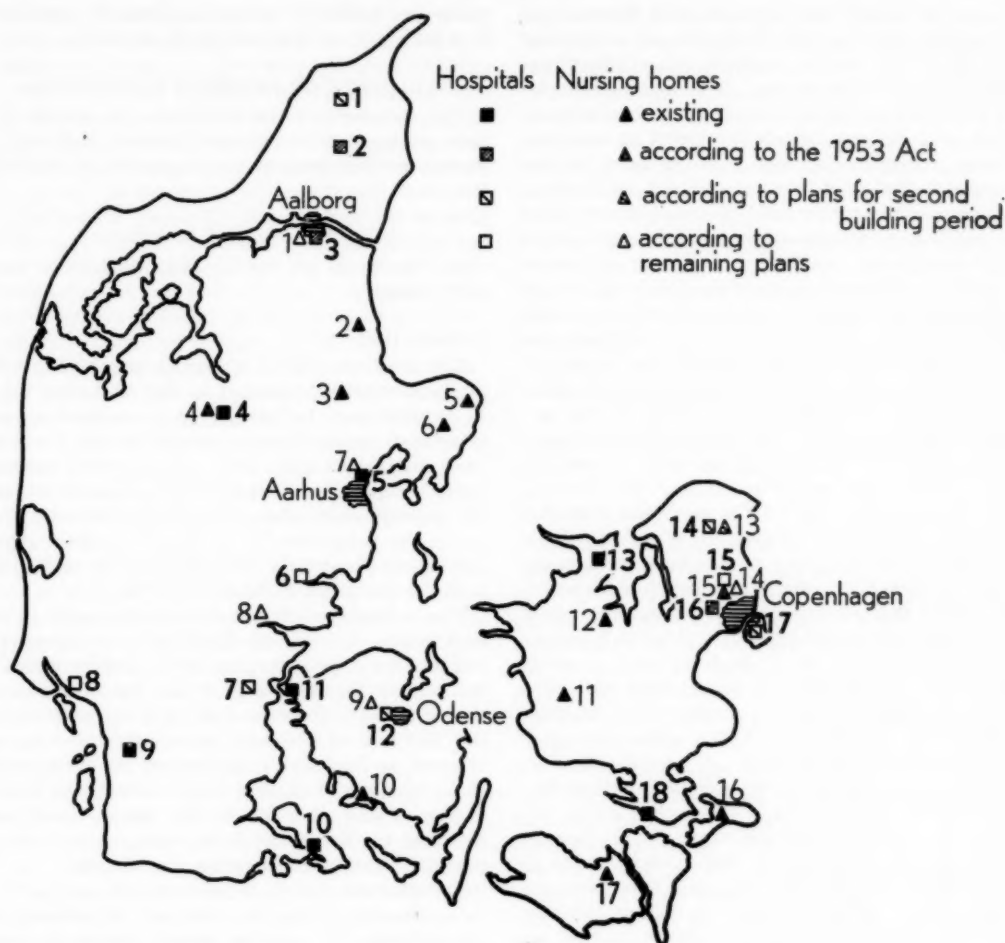
The total costs of the plan are estimated at about 350,000,000 kroner (18,000,000 £).

A number of additional general considerations have also been decisive in the drafting of the actual plans. A close union with the general hospital service has thus been considered of prime importance. Psychiatry must, at its present stage of development, necessarily cooperate with the other medical fields, and a close union of the new psychiatric hospitals with the general hospitals is further advantageous by stressing that there is no fundamental difference between mental and physical illness, thus counteracting the widespread discrimination against mental patients.

It has also been a fundamental principle that the new psychiatric hospitals must be smaller than the existing ones. The ideal size is of course open to discussion, but in the opinion of the commission units of 300—350 beds must be considered a reasonable aim for the time being. Such units are sufficiently large to permit the necessary degree of subdivision into different types of wards, and they will in general have a capacity which will correspond reasonably well to the region served by a regional general hospital ("Central hospital"). The building of more smaller units will also lead to a better contact between the hospital and the population in the region and thereby facilitate out-patient treatment.

There is fortunately a practical possibility of placing by far the most of the new hospitals in close proximity to the regional general hospitals, in some cases to existing ones and in others to newly planned ones. In the latter cases the possibilities of planning the two institutions in such a way that a smooth and economically advantageous co-operation is secured are of course particularly good.

The placing of the nursing homes has also been considered carefully. They, too, should be rather close to the general hospital, and it is an advantage for the patients concerned, who are often elderly, if their institution is easily accessible and preferably close to a larger city. Especially in the cities



Existing and planned Institutions of the State Mental Health Service in Denmark.

Hospitals		Nursing homes	
1. Hjørring	10. Augustenborg	1. Aalborg	10. Hvedholm
2. Brønderslev	11. Middelfart	2. Visborggaard	11. Sorø
3. Aalborg	12. Odense	3. Randers	12. Holbæk
4. Viborg	13. Nykøbing Sjælland	4. Viborg	13. Hillerød
5. Aarhus	14. Hillerød	5. Dalstrup	14. Gladsaxe
6. Horsens	15. Herlev	6. Raamosegaard	15. Ballerup
7. Kolding	16. Glostrup	7. Aarhus	16. Stege
8. Esbjerg	17. Taarnby	8. Vejle	17. Sakskøbing
9. Vedsted	18. Vordingborg	9. Odense	

In addition, a hospital is planned in the Faroe Islands.

there are relatively many elderly patients who can be placed in nursing homes, and it is desirable that they can be visited frequently and easily by their relatives.

The commission has discussed, at great length, the alternative of moving the centre of gravity of the psychiatric development to the regional general hospitals by building smaller *psychiatric clinics* within their structure. The small clinics should then take care of acute psychiatric cases, while the existing hospitals would be converted

into institutions for chronic patients only. If this plan were carried out, a rather large number of new psychiatric beds would be provided, thereby relieving to some extent the existing psychiatric hospitals; the general hospitals would also benefit from the readily available psychiatric assistance. However, the commission has regarded these viewpoints as being only partially valid. The relief offered to the psychiatric hospitals by such an arrangement can only be a limited one, because the patients going to a psychiatric clinic

are, on the whole, not identical with those going to a psychiatric hospital. This does not mean that the patients admitted to a psychiatric clinic do not need psychiatric treatment; they undoubtedly do. But we must face the fact that there is an enormous latent need for psychiatric treatment in the population, which we cannot hope to meet in the foreseeable future. For the present we must therefore necessarily try to meet the most urgent need for psychiatric treatment, and this is represented by the psychoses. As a further disadvantage it must be mentioned that if psychiatric clinics were built in the general hospitals, they would attract a large part of the already much too scarce staff from the psychiatric hospitals. There would also be an unfortunate tendency to concentrate the most effective and varied psychiatric therapies in the psychiatric clinics, while the psychiatric hospitals might degenerate into purely secondary hospitals. They would then get a reputation for housing only chronic and intractable patients, and this would be extremely unfortunate. The fact is that even if psychiatric clinics were built, a majority of the patients then admitted to psychiatric hospitals would still need treatment. At the very most 30 per cent of the patients in psychiatric hospitals can be said to be in no immediate need of active treatment, and it must be emphasized that even among the chronic patients treatment of the same high quality as that given to the acute patients is needed either continuously or periodically. Satisfactory conditions for treatment can therefore be obtained only in one of two ways: either the wards for chronic patients must also be moved to the general hospitals or the existing, more or less solitary, psychiatric hospitals must be modernized and staffed to such an extent that the required amount of treatment can be carried out there.

In view of the present critical situation of the State Mental Health Service the commission concluded that the building of new psychiatric hospitals must be the primary aim. The commission fully realized the importance of providing all general hospitals with psychiatric assistance and considered it as a matter of course that steps are taken to this end. But the commission felt that this important object must, everything considered, be secondary. It should in this connection be noted that when the new psychiatric hospitals are built as neighbours to or as parts of the general hospitals, they will of course also serve as psychiatric clinics for the acute cases admitted to these.

General hospitals to which no psychiatric hospital is attached will of course need small psychiatric clinics, and these must be provided successively as it becomes possible to staff them without undesirable effects on the psychiatric hospitals. Finally it must not be overlooked that in very large cities, as, e.g., Copenhagen, psychiatric clinics are of course urgently needed be-

cause the building of true psychiatric hospitals in a large city is not practically feasible.

STRUCTURE OF PSYCHIATRIC HOSPITALS

The structure of the psychiatric hospitals has been analysed in a separate chapter, both as regards their functions and as regards their building lay-out.

A. Functions of hospitals.

The functions are discussed in relation to each staff category.

Medical staff.

The medical staffing of Danish psychiatric hospitals is usually organized in the following way: A hospital unit is headed by a medical superintendent, assisted by two senior physicians who have permanent posts and who are fully trained psychiatrists; there are further a number of junior psychiatrists who serve for periods of 1—5 years. The usual number of doctors is about eight, but it has frequently been impossible to fill all posts in the more isolated hospitals.

The medical work has increased rapidly in recent years. The rising demands were primarily met by the appointment of more junior doctors, but within the last years it has become evident that optimal efficiency can only be attained if the number of medical superintendents is increased, so that each hospital unit becomes smaller. A number of factors have contributed to the larger amount of work for the doctors and particularly for the medical superintendents; among these the following may be mentioned:

(a) The increase in the number of beds and — in particular — in the number of admissions. Even though the work be distributed in the most rational way among the doctors, the ultimate responsibility for each patient must necessarily rest with the medical superintendent; it is a Danish tradition that the patients as well as their relatives expect a personal consideration of each case from the medical superintendent.

(b) The rapid development of out-patient work.

(c) The appearance of numerous new, primarily physical, methods of treatment. In order to supervise the administration of these satisfactorily the doctors must now have a much broader knowledge of biochemistry, physiology and internal medicine than was previously the case.

(d) Completely new categories of personnel (psychologists, occupational therapists, librarians, etc.) have been added to hospital staffs, and their work must be coordinated with that of the others.

(e) The teaching of the various personnel groups has been enlarged and must be carefully planned.

(f) The demand for psychiatric certificates from public authorities is rising steadily.

As mentioned previously, the commission has decided to aim at psychiatric units of 300—350

beds (in the hospital itself, to which must be added about 50 patients in nursing homes and a similar number boarded out with private families). Most by far of the existing hospital units are considerably larger and therefore must necessarily be further subdivided. This raises the question, also otherwise relevant, whether specialization among the doctors is desirable. It is difficult for each psychiatrist to master to perfection all the aspects of the psychiatric work, and a certain specialization seems necessary if all the diagnostic and therapeutic possibilities available shall be fully exploited. But since it is desirable that all the main subspecialties be represented in each hospital unit, the staffs and the units cannot be below a certain size. This is accentuated by considerations of training; during their training, the junior doctors must have an opportunity of becoming familiar with all the main aspects of the psychiatric work, and this would not be possible if each unit were primarily engaged in specialized work.

The laboratories play an important role in the medical work in a psychiatric hospital. They have always been small and poorly equipped, and as the demands on the laboratories have lately been raised considerably — in particular after the introduction of the new drug treatments — a radical change is obviously now necessary. The technical equipment is here not the only thing to be considered; it is equally important to secure expert assistance. The arrangement of this must to a large extent depend on the placing of the psychiatric hospital. If it is close to a regional general hospital, a cooperation with the laboratory there seems natural, and the laboratory in the psychiatric hospital need in that case only perform simple routine analyses. In cases where the psychiatric hospital is at a greater distance from a general hospital, it will be necessary to establish a more independent laboratory, but under the supervision of a consulting expert.

Nursing.

Danish psychiatric nurses have the same basic training as all other nurses. So far, most nurses have supplemented their basic training, which lasts 3 years, with 6 months' service in a psychiatric hospital; but the procedure has recently been changed by a new act. In the future, all nurses will attend a course of 4 months in a psychiatric hospital during the 3 years of their basic training.

An organized special training for psychiatric nurses has not existed so far, and only recently have courses been arranged for nurses who are engaged in the teaching of younger nurses.

In addition to the fully trained nurses a large number of other nursing personnel is employed in the psychiatric hospitals. They have been trained for one year only and exclusively in psychiatric hospitals; in the male wards these parti-

ally trained nurses (male and female) outnumber the fully trained ones. The possibility of organizing a training of 3 years' duration for male psychiatric nurses analogous to the arrangement in various other countries has been considered. This has, however, been rendered superfluous because according to the new act male nurses also can now become fully trained. One can hardly expect a man to prefer a special psychiatric training if, within the same period, he can obtain a complete training as a nurse and thereby gain much wider possibilities of employment. Even at best it will take a long time before a sufficient number of fully trained male psychiatric nurses become available, and one must therefore count on using the one-year course for male and female nurses also in the future. An intensification and improvement of the teaching is, however, undoubtedly possible.

Occupational therapy.

An increasing number of occupational therapists has been attached to the psychiatric hospitals in the latter years, but there are still so few that the nursing staff must take care of the main part of the occupational therapy. It is important that the occupational therapy becomes an integral part of all activities in the hospital, everyone on the staff must understand the fundamental principles of occupational therapy and be able to contribute to a successful realization of them.

So far, the main object of occupational therapy has been to keep the patients busy in the best possible way while they were in the hospital. During recent years it has become more and more important to concentrate on types of work such that the patients are thereby trained for life outside the hospital; occupational therapy has become a factor of significance in the "rehabilitation" of the patients. It is also a step in this direction that patients are given opportunities of attending courses outside the hospital, of being trained for special trades or industries, or of having previously acquired skills brushed up.

Physiotherapy.

Physiotherapy is being used more and more, and involves not only treatment of intercurrent physical diseases, but also relaxation therapy as an important part of the treatment of neuroses and — to a steadily increasing extent — "group motion therapy" of chronic patients.

Social workers.

The role played by social workers in the psychiatric hospitals has long been recognized as indispensable. Previously, the Danish psychiatric hospitals used mainly nurses who had had a certain supplementary training in social work, but more and more social workers with a special training are now being employed. A special training for psychiatric social workers has been

considered, but such a step seems as yet premature in this country.

Psychologists.

More and more psychologists are also being employed in the hospitals, and their primary function has been to test the patients as an aid in the diagnostic work. In the child psychiatric units they also frequently take part in the therapy, but so far this has been the case only to a very limited extent with adult patients. There are, furthermore, still so few psychologists that they are fully occupied by the test work, and an extension of their field must therefore, at present, be considered of secondary importance.

The commission points out that other special activities in the hospitals should also be promoted: library facilities, study groups, musical entertainment and activity, etc. Some of these can only be regarded as pastimes or as part of endeavours to make the stay in hospital more acceptable; others contribute significantly to the process of rehabilitation. In the existing hospitals such activities have had very unfavourable conditions, and care must be taken to remedy this when the new hospitals are built.

B. Building lay-out.

The commission has made only brief comments on building lay-out. Detailed recommendations cannot be given, since the structure of each hospital must depend largely on its location and particularly on its attachment to other institutions; but certain general lines may be indicated. It seems practical to place doctors' rooms, laboratories, out-patient clinic, etc., close together or in one building, which might also contain beds for patients under specially active treatment. Convalescents and also more chronic patients who need not be under strict observation during their treatment may be housed in pavilions in hospital grounds. A desirable differentiation of the patients would be made possible by this arrangement.

The commission attaches great importance to the provision of a sufficient number of single and double rooms and regards rooms with 4 beds as an absolute maximum. In this connection it may be mentioned that the patients are now permitted, to a much larger extent than formerly, to use their own clothes, to have their own wardrobe, etc., and thus to enjoy a certain amount of privacy.

The commission's ideas concerning the structure of psychiatric units is illustrated by supplements to the report, containing specimens of the architect's plans for the institutions at present under construction, *viz.*, the psychiatric hospital in Glostrup (which is being built adjacent to a new regional general hospital), the Brønderslev hospital, the nursing home in Viborg, and the child psychiatric clinic attached to the Aarhus hospital. (These plans have been published in the April issue of "Mental Hospitals", 1956.)

SPHERE OF ACTIVITY

Under its terms of reference the commission has considered closely the sphere of activity of the State Mental Health Service. It has been practical to make a rough distinction between those tasks which are naturally accomplished within the hospitals and those belonging rather to the out-patient sphere of work.

A. In-Patient Work.

There are a number of patient categories whose relationship to the psychiatric hospitals may be discussed.

1) *Criminal patients, i. e.*, persons admitted for forensic psychiatric observation, and persons sentenced to custody in a psychiatric hospital.

a) *Observation patients.* In Denmark the majority of forensic psychiatric examinations are carried out on an out-patient basis and as a consequence do not concern the psychiatric hospitals directly. But the relatively few patients who are admitted for observation present a major problem to the hospitals, and trouble is particularly apt to arise when the offenders are recognized as criminals by the other patients. One cannot disregard the fact that the presence of these criminals may add to the unpleasantness of a stay in a psychiatric hospital for the other patients. There is also the security question to consider. The legal authorities will often demand that special security measures are taken for these patients, and this has been particularly unfortunate in recent years when the general tendency has been to increase the freedom of patients. One has frequently to choose between placing these patients either in a quiet ward, with a resultant increase of the danger of escape, or in a security ward; but in the latter the other patients are usually disturbed, while the observation patients usually belong to a different category. Neither alternative is particularly attractive.

There has been a feeling among psychiatrists in favour of refusing all in-patient examinations, but such a course is hardly advisable in view of the increasing importance of psychiatric viewpoints in criminology. All in all, the prevailing attitude is that the admission of imprisoned persons for observation is at any rate undesirable, and that these should be referred to institutions under the prison administration while those persons who might, by the very nature of their case, be at liberty without much harm could be examined in hospital.

The question of forensic psychiatric examinations was discussed in a report made by a committee appointed by the Danish Ministry of Justice a few years ago. The report proposed the establishment of a special observation institution, which could take care of the majority of observations requiring admission. It was furthermore proposed to place this institution in a special security ward attached to the Nykøbing Sjælland

hospital, which at present houses the most dangerous psychotics. Due to progress in therapeutic procedures the occupancy in this ward has decreased considerably during the last years, so that half of it might be made available for the above-mentioned purpose.

b) Similar considerations to those concerning the observation patients are in many respects valid for patients sentenced to custody in a psychiatric hospital; their presence there is often felt as a heavy burden. Some of these patients are of course so affected by their mental disorder that it seems quite natural to place them in a psychiatric hospital; but for many others it is the criminal side of their personality which dominates the picture.

A committee appointed by the Ministry of Justice proposed in 1949 the establishment of a "criminal asylum" for mentally abnormal offenders. The commission agrees in principle with this idea but points out that this and related problems could be tackled best by a committee with representatives of all the administrative branches involved.

2) *Drug addicts.* The treatment of drug addicts presents a special problem to the State Mental Health Service, because these persons rarely suffer from true insanity; at the same time, however, their admission to a mental hospital is often desired, because treatment on an out-patient basis is usually ineffective. It is well known that the treatment of these patients may be immensely difficult, and they frequently cause a lot of trouble in the wards. Even if they do not present a large problem, quantitatively, their presence is often felt to be highly undesirable. But it is difficult to propose a different solution of the problem of treatment. It would hardly be rational to have special institutions for these patients, if only because the number of drug addicts varies so much. The commission finds that, everything considered, the admission of such patients to psychiatric hospitals must be tolerated, unless for other reasons they belong naturally to a different institution such as, *e. g.*, an institution for criminal psychopaths.

It may be added that the problem has been far more urgent for the City of Copenhagen, and at times the admission of criminal drug addicts has placed a very heavy burden on the municipal psychiatric hospital, Set. Hans Hospital.

3) *Alcohol addicts.* The treatment of alcohol addiction has made great strides in recent years. Up till 1948 the emphasis had been placed on institutional treatment, and a large number of alcohol addicts were admitted to psychiatric hospitals and to public and private homes for alcohol addicts. Most of the patients were admitted on a voluntary basis, and since only few succeeded in finishing the treatment, the results were often very poor. Commitment of alcohol

addicts to psychiatric hospitals was used only rarely.

The picture has changed significantly since the introduction of antabuse treatment in 1948; the emphasis is now placed on out-patient treatment, and this has led, on the one hand, to a relief of the psychiatric hospitals and, on the other, to the establishment of therapeutical contact with many more alcohol addicts than formerly.

There has been some uncertainty as to which authorities are responsible for the treatment of alcohol addicts. When the addiction to alcohol assumes the character of a true disease, the Health Service must obviously take charge; in other cases the initiative is left to social authorities or private persons. It is evident that this distinction is often very difficult. The existing institutions for alcohol addicts are of a highly varying structure; some are private, some municipal, and some of a mixed character. The recent developments in the treatment of alcoholism have led to the establishment of a number of new institutions.

A commission has been appointed by the Ministry of Social Affairs to work with alcohol problems, including the question of treatment, and it is expected that the initiative will be referred to the municipal authorities. But psychiatrists must of course be engaged in the treatment, and as more psychiatric hospitals are built throughout the country, the psychiatrists will play an increasing role in the out-patient work with alcohol addicts.

4) *Psychopaths.* Special institutions have been built only for criminal psychopaths; but the majority of psychopaths are not criminals, and if they are in need of psychiatric assistance they must be referred to the psychiatric clinics or hospitals. They are here treated on an out-patients basis, if it is at all feasible, because it is important that they stay in their jobs. It is furthermore a general experience that psychopaths are often affected in an unfortunate way by a stay in hospital, just as they have a bad influence on the atmosphere in the wards. There has accordingly been an understandable tendency to avoid the admission of psychopaths to psychiatric hospitals, and the establishment of special institutions for non-criminal psychopaths has even been considered. But it seems very doubtful whether such institutions would be viable, and even at best they could presumably take only a minority of psychopaths. It seems to be a suitable arrangement if psychopaths are admitted to the psychiatric hospitals only during acute phases and for as short a period as possible, and that their subsequent attempts at resocialization are supported on an out-patient basis. The importance of this psychiatric task has been emphasized by the recent introduction of drugs which may be effective in ameliorating some of the psychopathic symptoms.

5) *Neurotics*. Even if the psychiatric hospitals are primarily intended for psychotic patients, a certain number of neurotic patients also have always been treated there. In recent years 11 per cent of those admitted to the hospitals and 40 per cent of those treated in the out-patient clinics have been neurotics. It is natural that the latter figure is the higher of the two; treatment of neuroses should preferably be performed in out-patient clinics, and the overcrowding of the hospitals has furthermore had the effect that those patients who can manage without admission have been treated outside the hospital. It must be admitted that the conditions which it has been possible to offer the admitted neurotics have been far from satisfactory. Due to the overcrowding it has rarely been possible to reserve special wards for the neurotics, and they have often suffered from being placed among psychotic patients. As more beds eventually become available, it should be possible to reserve certain wards for neurotics and thus to give also this patient group a proper therapeutic environment.

Admission to a psychiatric hospital will presumably never become a central point in neurosis treatment, but even so a not inconsiderable number of neurotics will still be in need of treatment in these hospitals. Neurotics are occasionally admitted during psychotic phases or as a consequence of acute emotional crises, and in these cases it is often natural that treatment be continued in the hospital, even if the patient's condition changes; a change of doctors is particularly unfortunate for neurotics.

The psychiatric hospitals have thus, in fact, had, and also in future will have, a function in the hospital treatment of some of the neuroses, and it is important that the special needs of this patient group be taken into consideration when an extension of the hospital service is planned. In this connection it must be remembered that the treatment of neuroses is highly skilled work and that not only special wards are needed but also doctors and nurses with the requisite qualifications.

There is, however, a certain category of neurotics who cannot be properly treated in general hospitals or in out-patient clinics but who, at the same time, do not actually need admission to a psychiatric hospital and who also usually avoid it as far as possible. It is with these patients in mind that one has considered the building of special sanatoria for neurotics; a few such institutions already exist, *viz.*, one attached to "Kolonien Filadelfia", a second, "Montebello" at Helsingør, which belongs to the City of Copenhagen and some adjacent districts, and finally a recently established one in Jutland ("Vejlefjord").

It may be asked whether the building of such sanatoria ought not to be integrated with the building plans of the State Mental Health Service. But this would hardly be appropriate, partly

because it is only a limited demand which will presumably be met in other ways, and partly because the State Mental Health Service can best contribute to solving this problem through the medium of its own psychiatric hospitals.

6) *Old persons*. As emphasized repeatedly, problems concerning the aged have become more pressing during recent years in the psychiatric hospitals also. The admission of seniles to the psychiatric hospitals does not as yet present a dominating problem, but there is strong indication that this may be so in the not too distant future. It has become evident that many of the old inhabitants of nursing homes and homes for the aged are more or less mentally abnormal, and it would not be unreasonable to admit many of these to psychiatric hospitals. Their number is presumably so large that the capacity of the psychiatric hospitals would be thereby far exceeded. But nor should this be necessary. Many of the patients with only slight mental abnormality can undoubtedly be treated quite properly in ordinary nursing homes or homes for the aged. When more acute phases develop, especially if accompanied by agitation and delirium, admission to a psychiatric institution is obviously advisable. One might consider the establishment of special wards in the psychiatric hospitals as well as of special units within the larger homes for the aged, equipped for the care of more pronounced psychiatric disorders. Psychiatrically trained personnel must in that case be employed, and such units should be supervised by fully trained psychiatrists.

7) *Children and adolescents*. Child psychiatry has developed rapidly in Denmark during the last two decades, and several out-patient clinics, as well as a few in-patients units, have been established (at Rigshospitalet in 1944, at Bispebjerg Hospital in 1948). In spite of this rapid development the demand for child psychiatric help is far from covered. It is very difficult to make an estimate of the size of this demand, but several institutions, both in-patient units and out-patient clinics, can safely be built before the requirements are met. Large parts of Denmark are practically devoid of child psychiatric help, but the rate of development is limited by a lack of qualified personnel. Great stress must therefore be laid on a comprehensive and intensive training of suitable personnel during the coming years.

As mentioned previously, the Act of 1953 contains a provision for the building of a child psychiatric clinic attached to the Aarhus psychiatric hospital. This clinic will be opened in 1958. According to the same act child psychiatric clinics will also be attached to the new hospitals in Glostrup and in Aalborg.

It has been considered practical not to make these clinics too large, because large institutions are more difficult to manage. In the child psychiatric clinics which are built first it will be necessary to have special wards for psychotic

children. The number of such children in Denmark is not known, but is possibly around 100—200. When the demand for these beds has been met, it will probably be possible to build child psychiatric clinics exclusively for less severe cases. Out-patient clinics will of course be attached to all the child psychiatric units.

Mentally abnormal adolescents present a major problem, and the commission has not been able to lay down conclusively the lines for future planning. A close cooperation with the Child Welfare Authorities is of course necessary and may give rise to a number of administrative questions, and the commission has proposed that these problems be discussed by the State Mental Health Service, the Child Welfare Authorities and the Central Health Administration.

8) *Epileptics and psychotic mental defectives.* Only a few of the patients in psychiatric hospitals are epileptics. By far the majority of hospitalized epileptics are in the Department of Epilepsy in "Kolonien Filadelfia", and there is a good cooperation between this hospital and the State psychiatric hospitals. There seems to be no reason why the State Mental Health Service should build special wards for epileptics.

There is in Denmark a clear distinction between the treatment of mental defectives and of other psychiatric cases, and doubt only arises as regards those defectives who are also psychotic. Some of the institutions for mental defectives prefer, as far as possible, to keep and to treat these cases, while others refer them to a psychiatric hospital and want them to stay there during the psychotic phases. In a few cases with frequently recurring psychoses it has been considered the best solution that the patients remain in the psychiatric hospital also during the non-psychotic intervals. The cooperation between institutions for mental defectives and the psychiatric hospitals has been practically frictionless for a number of years, and there is no reason for changing the present arrangement.

9) *Tuberculous patients.* A special new ward for tuberculous patients was opened in the Middelfart psychiatric hospital in 1937, and patients suffering from tuberculosis in an infectious stage have since been referred to this ward from all the State psychiatric hospitals. The ward has 100 beds and was at first fully occupied, but due to progress in the therapy of tuberculosis the occupancy has been steadily decreasing and now corresponds to only 30—40 beds. The question of a different use of this ward has therefore arisen. At the same time the tuberculosis sanatoria have an increasing number of unoccupied beds, and it has been discussed whether the few remaining psychiatric patients with tuberculosis should be moved to a special unit in a sanatorium. Concrete plans for this are at present being worked out; it is of course a condition that the possibilities

for adequate psychiatric treatment are not thereby reduced.

B. Out-patient work.

1) *Prevention.* The main object of the psychiatric hospitals is to take care of diagnosis and treatment, and they are thus not primarily concerned with preventive problems and measures; but there is an obvious preventive element in the control of discharged patients which is undertaken by the out-patient clinics. More general preventive efforts cannot be expected from the psychiatric hospitals and would also, in view of the size of such tasks, far exceed their resources. But it must be emphasized that the psychiatric hospitals are so deeply interested in questions of prevention that all reasonable appeals for assistance will be very favourably received.

It must also be remembered that preventive psychiatry is still at a preparatory and experimental stage, and under these circumstances it seems reasonable that the psychiatric hospital service should limit its activities and concentrate its forces on diagnostic and therapeutic work. It is therefore to be welcomed that a private initiative has been taken through the League for Mental Hygiene. The League has organized advisory mental health consultations at various places in the country, and the psychiatric hospitals have occasionally assisted by offering psychiatric personnel. This cooperation seems natural in view of the difficult distinction between preventive and therapeutic tasks.

2) *Diagnosis and treatment.* It is surely in the interest of all parties concerned that all possibilities of carrying out diagnostic and therapeutic work outside the hospitals should be exploited. Consequently the State Mental Health Service organized psychiatric out-patient consultations at an early date, and these facilities are now available in connection with all psychiatric hospitals. The activities include after-treatment of discharged patients as well as examination, and to a certain extent also treatment, of patients referred from general practitioners. Doubt may of course arise as to which patients should be referred to an out-patient consultation and which to private psychiatrists, but the question has been of little practical importance; the number of practising psychiatrists is so small that the out-patient work far exceeds their capacity, and the question of the remuneration of the private psychiatrists has moreover been satisfactorily settled in only a few places. If this is changed, so that the public gets more easy access to assistance from private psychiatrists, it would presumably be appropriate for the activities of the psychiatric hospitals to be limited to after-treatment of discharged patients and to the administration of special treatment, *i. e.*, treatment for which apparatus and other facilities are required which are not usually at the disposal of the practising

psychiatrists. One might in this connection remember that, so far, the field for ambulatory psychiatric activity seems to be almost infinite, and it will take a long time before all who need psychiatric treatment can have it. It is therefore important that treatment by trained psychiatrists be reserved for those cases who cannot otherwise be helped; there are fortunately many who can be treated successfully by a doctor without a full psychiatric training. Much will therefore be gained by a close cooperation between the general practitioners and the psychiatrists and also between the latter and the general hospitals; this cooperation would be furthered by all doctors receiving a better training in psychiatry and if there was more mutual consultation between the various fields of medicine.

In order to get an estimate of the magnitude of the problems concerned, the commission has had various statistical studies carried out and has also used a few existing studies:

a) In a department of internal medicine in a general hospital (Aarhus Amtssygehus) dr. H. C. Helsing carried out a psychiatric examination of 500 patients. He found that 22 per cent of the cases were purely psychiatric, while in 19 per cent physical disease was accompanied by a psychic component.

b) An investigation into all patients admitted during one month to two other departments of internal medicine (Hillerød and Aalborg) was carried out. The material comprised in both cases 264 patients. In both materials 34 per cent of the adult patients suffered from a mental abnormality; in Hillerød 91 per cent and in Aalborg 67 per cent of these were in need of psychiatric assistance. It was estimated that about 10 per cent of all the patients admitted ought to have gone directly to a psychiatric hospital.

c) The importance of mental disorders in general practice was studied in a third project. Twenty-seven general practitioners near Aarhus made a statistical analysis of their work during one month. The cases treated were divided into three groups: 1) those determined only by mental factors, 2) those determined partly by mental factors (and demanding a psychiatric approach from the doctor), and 3) those determined only by physical factors. A survey of all studies showed that 9 per cent of the cases belonged to group 1) and 13 per cent to group 2). Most of the doctors pointed out that the cases belonging to groups 1) and 2) occupied a disproportionately large part of their working time. As a rough estimate it could be stated that the cases determined by mental factors accounted for at least 30 per cent of the working hours and probably as much as 40—50 per cent.

The commission's statistical committee has drawn the following conclusions from its study of these problems:

"Neuroses and psychopathies play even now a large role in the psychiatric hospitals. In the out-patient clinics they represent 40—50 per cent of the patients, and among the admissions about 20 per cent. But due to the short time usually spent in hospital by these patients they only occupy about 5 per cent of the beds."

"Studies performed in various parts of the country indicate that 20—30 per cent of the patients admitted to the departments of internal medicine in general hospitals suffer from mental disorders which demand psychiatric treatment."

"About 15—30 per cent of the patients treated by general practitioners suffer from diseases that are partly or exclusively of a psychiatric nature; these cases are estimated to occupy 20—30 per cent of the doctors' working time."

"If the psychiatric hospitals are to treat neurotics and psychopaths more extensively than has been the case so far, only relatively few extra beds are needed, whereas the medical staff must be increased considerably."

"A close cooperation between psychiatric units and units of internal medicine would probably lower the number of admissions to the latter by 5—10 per cent, and in a similar number of cases the stay in hospital could be considerably shortened. In a medical unit with 3,000 admissions per year the demand for psychiatric assistance would presumably correspond to the work of at least two full-time doctors."

"The extent of the psychiatric work in general practice is so large that only a minor part can be referred to trained psychiatrists, but a qualitative improvement of the work might be achieved first and foremost by an improvement in the psychiatric training given to all doctors and by an extension of the cooperation between general practitioners and specialists."

The question of special out-patient institutions for neurosis treatment has been debated for several decades among Danish doctors. The medical organizations have several times appointed committees, and these have concluded that one *neurosis station* should be established as an experiment. The commission has taken the attitude that since so little is actually known about the efficiency of neurosis treatment, the State might reasonably perform the first experiment in this field. In order to give the experiment a fair chance the neurosis station should have satisfactory facilities, particularly a staff of a suitable size and with the best possible personnel. No definitive decision has been reached concerning the location of the projected neurosis station.

3) *After-care*. It has been a widespread opinion among psychiatrists that the psychiatric care for discharged patients is highly insufficient and that several readmissions might be avoided with a better after-care. A closer scrutiny of these matters seems to show that several possibilities for some degree of after-care do, in fact, exist under the present legislation, but that these possibilities have not always been fully exploited. Furthermore, in 1956 an act was passed concerning the coordination of relief measures for handicapped persons, expressly including those handicapped by mental disorders. This has led to an improve-

ment of the conditions in this field, and a certain place has been secured also for psychiatry.

Among desirable measures one might mention the following: that more economical aid to discharged patients be made available; that the number of social workers in the psychiatric hospitals be increased; that more posts for social psychiatrists be made available; that the existing advisory councils for the handicapped obtain more support; that special work-shops be created for training, under protected conditions, handicapped persons, including the psychiatric cases; that boarding houses for recently discharged patients be made available; that day hospitals be established for patients who are able to spend the night outside hospital but who cannot otherwise be suitably employed during the day; that patients in hospital be given more access to teaching and training outside the hospital; that some patients in hospital, to a certain extent or at least for a certain period, be given paid employment outside the hospital; that the sharp distinction between patients in hospital and outside hospital be abolished, so that a more gradual transition to free life after discharge would be made possible; and finally that patient clubs be established in or near the hospitals. The discharged patients could here maintain to some extent the sense of community which they had acquired in the hospital and without which they might feel lonely and rootless.

The experience with these various fields must necessarily be very scanty, and any attempts will be to some extent of an experimental nature.

C. Research.

The concluding chapter of the commission's report is devoted to the question of research in the psychiatric hospitals. It is pointed out that clinical research is inextricably bound up with work at the bed-side, and active research work in the hospitals is a condition for therapeutic progress. In this respect the psychiatric hospitals have, primarily due to their frequently unfortunate placing, been particularly badly off. The lack of contact with the other medical fields and the poor laboratory facilities have considerably hampered initiative. The commission feels that stimulation of research activity is one of the most important factors in the process of renovation which is being planned. It would be of importance if an independent psychiatric research institute could be established, preferably in connection with the Aarhus hospital, which already functions as a university clinic. It is, however, highly important that research can be carried out in all the hospitals; a development in this direction will be aided by the necessary modernizing of the hospitals and particularly by an improvement of the laboratory facilities.

The report underlines that not only must the hospitals be equipped with sufficient apparatus and funds, but also the staff must be of such a size

that individual members can at any time be relieved for research purposes.

Since, as mentioned above, treatment and research are closely allied, these recommendations are not in any way remarkable; the expenses involved will usually be relatively small, and they are very sound investments on the long view. The Directorate of the State Mental Health Service will always be able to exert an economical control and may consult the proper experts on the subject.

It seems hardly necessary to add that this would also influence favourably the recruitment of qualified physicians to the psychiatric hospitals by changing the perspectives and leading to better prospects than exist to-day. The treatment of psychiatric patients will hereby receive a very important, and even essential, infusion of impetus and optimism, which can hardly avoid influencing also the public opinion of mental patients and the hospitals in which they are treated.

If sight is lost of the research problems, a very important part of the incentive is lost from all other reform plans that may be carried out. The research question is thus of central importance for the future of the Mental Health Service.

I am greatly indebted to dr. Peter Aungle and dr. Mogens Schou for their most valuable help in preparing the English version of this article.

SUMMARY

In November 1956 a report was published by a commission which had been appointed by the Danish Government to consider the State Mental Health Service. On the basis of a review of this report a survey is given of the present-day structure, functions and problems of the Mental Health Service, and of the plans advocated unanimously by the commission.

The fundamental principle for the future development must be the close attachment of the Psychiatric Hospitals to the General Hospitals. The size of new hospitals should not exceed 350 beds. The hospitals should treat all psychiatric patients (with the exception of oligophrenics), but they must have possibilities for transferring a limited number of chronic patients, mainly senile, to special psychiatric nursing homes. The commission has outlined a 20-year-plan for the revalidation of the Mental Health Services: of the existing 7 hospitals 6 should be thoroughly modernized and one converted into a nursing home. 12 new hospitals and 7 nursing homes should be built. — Some of the plans have been put into action: 2 nursing homes and 1 hospital have been established, and a second hospital is under construction.

References:

- 1) Betænkning afgivet af kommissionen af 29. marts 1952 vedrørende Statens sindssygevesen. Copenhagen 1956.
- 2) Maire, L. le: Plans for Psychiatric Institutions in Denmark. Mental Hospitals, April 1956, p. 22—27.

OPERATIVE TREATMENT OF ATRESIA OF THE OESOPHAGUS

RESULTS AND COMPLICATIONS

By TYGE CL. GERTZ and C. C. WINKEL SMITH

Sixteen years ago, Cameron Haight successfully operated upon a case of atresia of the oesophagus in one session by a transthoracic intervention. Since then this method has been that of choice in the treatment of the previously fatal malformation, while other methods, in which by operation in several sessions an attempt was made to establish a passage by the construction of a new oesophagus, have become obsolete except in those rare cases in which the diastasis between the two segments of the oesophagus is so great that direct anastomosis is not possible. By means of the experience gained since 1941 the method is now established and the pre- and post-operative therapy follow definite rules. Opinions differ only concerning a single problem, *viz.*, whether transpleural or retropleural approach is to be preferred.

The intervention, however, even in places where a considerable number of cases have been operated upon, is still associated with a high mortality. Table I shows the mortality in a series of extensive materials from recent years, all of which with one exception originate from U. S. A. The material of Sandegaard represents the total number from 4 departments of paediatric surgery in Sweden (Lund, Gothenburg and 2 in Stockholm) operated upon during the years 1951—57.

Table I.

	Year	Number	Mortality
Leven et al.	1952	103	45 %
Haight	1952	131	57 %
Gross	1953	233	53 %
Shaw et al.	1953	61	59 %
Koop et al.	1954	74	54 %
Clatworthy	1954	35	51 %
De Boer & Potts ..	1957	114	49 %
Humphreys	1956	88	64 %
Sandegaard	1957	105	44 %
Haight	1957	200	46 %

Thus the mortality is not under 44 per cent in any of the more extensive materials and in the majority it exceeds 50 per cent. The figures are not, however, directly comparable as some of the accounts over the most recent years, the Swedish account covering only the years 1951—57, while other authors include cases also from a period prior to 1941, *e. g.*, Shaw and Humphreys.

Singularly enough, the majority of accounts contain very little information concerning the

causes of death. It is recorded that the majority of deaths were due to pulmonary complications, thereafter to other malformations (de Boer & Potts), only a few to insufficiency of the sutures, but no comprehensive analysis has been undertaken. Such a serious complication as recurrence of the oesophageal fistula is not mentioned. Only one account (Shaw et al.) supplies a detailed review of the causes of death and the complications and it appears from this article that the purely technical complications of the operation play a particularly great part in the high mortality. In Shaw's material, in which 37 patients died, the causes of death in 10 cases were pulmonary complications while in no less than 20 the cause was connected with technical complications, either insufficiency of the sutures, stricture or recurrent fistula. We are of the opinion that it is of great significance for the improvement of the results in future that such analyses be published. We have therefore reviewed our material from the Paediatric Department in the University Hospital, paying particular attention to the causes of death and the complications.

MATERIAL

Since we commenced operative treatment for this malformation in 1948 and until and including the first 6 months of 1957, a total of 67 newborn infants suffering from atresia of the oesophagus have been admitted and of these 39 died in the Department. This gives a total mortality of 58 per cent for both operated and unoperated cases. In Table II the number of admissions and deaths in the separate years will be seen. The number of admissions has remained fairly constant at 7—9 cases annually except in the first two years and represents probably the majority of cases diagnosed in Denmark.

Table II.

	Admissions	Deaths	Mortality
1948	4	4	100 %
1949	5	4	80 %
1950	7	4	57 %
1951	8	7	87 %
1952	8	3	37 %
1953	8	5	62 %
1954	7	3	43 %
1955	9	4	44 %
1956	9	4	44 %
1957	2	1	50 %

As the table shows, the mortality varies in the individual years but a definite tendency to im-

From The Paediatric Department, Rigshospitalet, University of Copenhagen. (Head: Professor P. Plum).

provement is seen in recent years. The improved prognosis becomes very apparent if the years 1948—51 and 1952—57 are grouped together as the mortality in the former period is 19 out of 24 or 79 per cent and in the latter period 20 out of 43 or 46 per cent. The latter figure corresponds very closely to that obtained in the Swedish material for the same period.

Types of Malformation.

Atresia of the oesophagus occurs in several forms of which the most common is that in which the upper segment of the oesophagus ends blindly while the lower segment is united by fistula to the trachea slightly above the bifurcation. This type, which is the most amenable to operation, was present in 61 cases (90 per cent) in our material and this figure corresponds to that found in other materials. In 4 cases no fistula to the lower segment was found and this segment was then very short. One of these cases had fistula to the upper segment and the remainder had no oesophagotracheal fistula. In one case, fistulae both to the upper and lower segments were present and, finally, in one case oesophagotracheal fistula was combined with marked stenosis at the site of the fistula but without complete atresia.

Cases in which Operation was not Undertaken.

In 8 cases operation was not performed or only palliative gastrostomy was undertaken on account of poor general condition. In reality, the majority of these infants were moribund on admission. Four died already during the first 24 hours after admission and the remainder in the course of 2—3 days. No less than 4 were over the age of 6 days on admission (6—13 days) and 2 had a birth weight of under 2,000 g. In one case operation was not performed on account of mongolism.

Singularly enough, it was demonstrated at autopsy that 3 of these infants did not have the typical malformation as there was no oesophagotracheal fistula. Correction of the total mortality by subtracting these 9 cases from the total appears to be justified. In this way, the mortality for the operation becomes 30 out of 58 (52 per cent). The figure for 1952—57 corrected in this manner is 39 per cent.

Cases in which the Operation was Incomplete.

In 6 cases the operation could not be completed. The anastomosis had to be abandoned on account of too large diastasis and cutting-through of the sutures. The majority of these cases originate from the first years and only in one case were the difficulties caused by atypical atresia without fistula to the lower segment. During recent years both segments of the oesophagus have been mobilized to a greater extent and these difficulties have seldom been encountered.

Cases which were Operated upon Radically.

Radical operation was carried out in 52 cases and out of these 24 died (46 per cent). Of the 28 survivors, 3 died later while the remainder have thrived on the whole.

OPERATIVE TECHNIQUE

In all cases radical operation in one session as described by Haight was attempted. In 1948, when the authors commenced operating upon these infants the extrapleural approach, in which 3—4 ribs are resected posteriorly on the right side, was chosen. In 1949, one of the authors (Gertz) attempted to operate upon 2 cases employing the transpleural approach and this was successful in the first case (Figure 1) while the other infant died 6 days post-operatively from malformation of the heart (atrial septal defect).



Fig. 1.

The authors' first surviving case, aged 8 years.

For a period, the authors hesitated to change over completely to the transpleural approach, particularly because it was feared that the sequelae of suture insufficiency would be difficult to control. Since 1951, all the operations have been undertaken transpleurally through incision in the fourth or fifth right intercostal spaces and the authors are convinced that this approach has so many advantages compared with the extrapleural

approach that despite the undoubtedly increased risk in case of oesophageal insufficiency it is to be preferred. The approach is easier and more rapid, the closure is easier and the wall of the thorax is more stable during the first critical post-operative days during which pulmonary complications in particular may occur.

Table III shows the distribution between the two methods of operation.

Table III.

	No.	Deaths
Retropleural	10	7
Transpleural	42	17

The fact that the relative mortality is greater following the first operative approach must not be regarded as evidence in favour of the second method. It must be borne in mind that the cases in which the retropleural approach was employed all originate from the first years during which our experience, not the least as regards the post-operative care, was less than today. We have no reliable basis for a comparison. Some authors (de Boer & Potts) prefer the transpleural approach while others, equally experienced (Shaw et al., Clatworthy), recommend the extrapleural approach.

As regards the technique of anastomosis, attempts have been made to establish an end-to-end anastomosis without tension. In recent years, as mentioned previously, the two ends of the oesophagus are mobilized to a fairly great extent and in this manner completion of a satisfactory anastomosis has nearly always been possible. There are, however, still cases in which the diastasis is so great that certain tension cannot be avoided. The anastomosis is performed with a single row of interrupted sutures of atraumatic silk (5 × 0) and only occasionally with a double row. The tracheal fistula is closed with interrupted silk sutures or with a short continuous suture but never only by ligature. After the introduction of the transpleural approach, pleural drainage is limited to a de Pezzer catheter brought out in the axilla or anteriorly.

During the first years, gastrostomy was performed routinely 24–48 hours after the operation while in more recent years it has been limited to cases in which complications occurred or could be anticipated, fluid balance being maintained in the infants by intravenous infusion and cautious oral feeding being commenced 2–4 days after operation when the general condition permitted. Blood and/or plasma transfusions have been employed routinely during the first postoperative days.

RESULTS

Effect of Birth Weight on Results.

A certain degree of underweight is, as a rule, present in these infants. Thus, the birth weight

in no less than 37 cases was less than 3,000 g. Apart from the very premature infants with birth weight of under 2,000 g of whom none survived, the mortality, however, appears to be fairly independent of this factor as will be seen from Table IV.

Table IV.

	Admissions	Deaths	Mortality
> 2,000 g	4	4	100 %
2,000–2,500 g	12	6	50 %
2,500–3,000 g	21	13	62 %
< 3,000 g	30	16	53 %

The chances for a full-time baby do not appear to be better than for a slightly premature infant. Humphreys arrived at a similar result while Sandegaard, who divided his material into those over and under 2,500 g found a better prognosis for the infants over 2,500 g.

Significance of Age at Operation.

Another factor which might be anticipated to influence the mortality is the age at operation as delay in establishing the diagnosis might be assumed to increase the pulmonary complications and thereby reduce the chances for a successful operation. It appears from Table V, however, that this can not be demonstrated.

The figures are admittedly small but no impairment of the prognosis is observed when the operative intervention is undertaken within the first 6 days of life. The oldest infant in this

Table V.

Age at Operation	Admissions	Deaths	Mortality
1 Day	16	10	62 %
2 Days	16	9	56 %
3 Days	13	7	54 %
4 Days	6	4	67 %
5 Days	5	2	40 %
6 Days	4	1	25 %
> 6 Days	7	6	86 %

material was 3 weeks of age. This was the case with oesophagotracheal fistula and stenosis but without atresia.

COMPLICATIONS

The complications could arbitrarily be divided into those present before the operative intervention, *e.g.*, pulmonary complications and malformations in other organs and those related directly to the operative technique, *e.g.*, suture insufficiencies, strictures and recurrence of the oesophagotracheal fistula.

Pulmonary Complications.

Seven infants died on account of pulmonary complications. Atelectasis or pneumonia, frequently both, were concerned and led to death during the first–fourth post-operative days. In all cases, both the oesophageal anastomosis and the closure of the tracheal fistula were found to be adequate.

As a consequence of the anatomical conditions in atresia of the oesophagus, pulmonary complications, particularly, threaten infants with this malformation during the first days of life. Saliva and milk which the infant attempts to swallow flow over from the closed upper segment of the oesophagus into the larynx and down into the bronchi and thereby cause early pulmonary involvement. In the most frequent form of the malformation with oesophagotracheal fistula, this threat is double as the regurgitated gastric contents will also flow into the trachea and bronchi. In agreement with this, all the infants were, on admission, affected by pulmonary involvement, frequently in the form of massive atelectases particularly in the upper lobe of the right lung (Figure 2) but in any case as scattered areas of bronchopneumonia. This was manifest clinically by cough, ronchi, dyspnoea and attacks of cyanosis. An oxygen tent was practically always

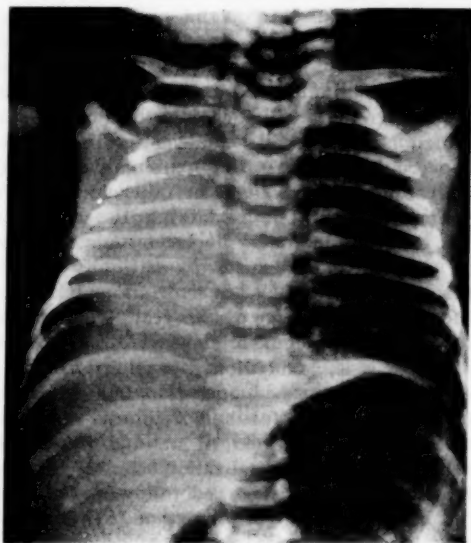


Fig. 2.

Typical picture of the thorax from a case of atresia of the oesophagus with oesophagotracheal fistula. Marked atelectasis of right lung. The stomach is greatly distended with air.

necessary immediately on admission. Not infrequently the pulmonary complications were further accentuated by attempts to establish the diagnosis. Radio-opaque media had been administered orally in the local hospitals and the bronchi had thereby become filled with this (Figure 2). Pulmonary complications were the main cause of the poor general condition which prevented radical operation in 8 cases.

The fact that in only seven of the infants in whom radical operation was performed pulmonary complications were the sole cause of death is due to various reasons. One reason is that, particularly



Fig. 3.

Result of pre-operative investigation with radio-opaque medium. In addition to filling of the upper segment of the oesophagus, the trachea and bronchi have been filled with radio-opaque medium and there is overflow via the fistula to the lower segment.

in recent years, operation has been postponed for 12 to 24 hours and during this period attempts at pulmonary toilet have been made by means of endotracheal suction, physiotherapy, antibiotics, etc. The technique of anaesthesia employed has probably also been of decisive significance. In all cases, intubation anaesthesia was employed so that free airway could be ensured during the entire operation and no detrimental sequelae of this technique such as oedema of the larynx have been observed (Secher). This procedure also renders possible effective suction of the secretions from the bronchi and inflation of the atelectatic segments of the lungs when the thorax is opened. In agreement with this, decisive improvement of the pulmonary function was observed, as a rule,

already during operation and this improvement persisted post-operatively when the causes of the pulmonary complications had been removed. Finally, the post-operative regime plays a great part. Daily radiographic control ensures that the lungs are kept inflated, possible pneumothorax is detected in time and atelectasis is revealed. Secretions and saliva are regularly aspirated from the upper respiratory passages and should signs of accumulation of secretion or atelectasis occur, endotracheal toilet is undertaken. Tracheotomy has been employed only in a minority of cases and hitherto without success but will probably be of value when increased experience has been gained in cases in which the pulmonary function is greatly reduced as a considerable segment of the dead space is hereby bypassed and aspiration of the trachea is facilitated and can be performed more frequently.

Other Malformations.

Severe malformation of the heart was the primary factor in 3 deaths. One of these cases showed ventricular septal defect, another a large atrial septal defect and the third had cor triloculare. The two first infants died within the first week and the third not until 2 months after operation.

Accompanying malformations in other organs were factors of significance for the result of operation. They occurred with great frequency but, naturally, were not all of vital significance. In the present material, other malformations were found in 14 cases or 21 per cent, a figure which is lower than those found in other materials. Shaw found 25 per cent, Sandegaard approximately 30 per cent and Humphreys even over 50 per cent. A review of the malformations found in other organs than the oesophagus is presented in Table VI.

Table VI.
Concomitant malformations.

Heart and Great Vessels.....	7
Atresia of the Anus.....	2
Horseshoe Kidney.....	1
Hypoplasia of the Biliary Tract.....	1
Malformations of the Extremities.....	2
Malformations of the Lungs (absence of division into lobes).....	1
Malrotation.....	1
Situs Inversus.....	1
Hydrocephalus.....	1
Mongolism.....	1

The figures represent a minimum. The surviving patients were not investigated especially, for example, regarding malformations of the urinary tract and even other deformities may have been overlooked. By far the largest and most important group is that of cardiovascular malformations. In addition to the three cases already mentioned, coarctation of the aorta occurred (2 cases), combined in one case with situs inversus; further,

subclavian artery with an abnormal course ligated at re-operation and, finally, one case of Steno-Fallot's disease. The last mentioned case which had, in addition, atresia of the anus, died at the age of 2 years from the cardiac condition which had not been operated upon. The 2 cases of atresia of the anus required corrective intervention simultaneously with the treatment of the atresia of the oesophagus. The nature of the remaining malformations appears from the table. None of them was a definite contributory cause of death.

Strictures.

In 18 cases the immediate post-operative course was uneventful and they were all discharged 16 days — 2 months after operation without further treatment (average one month). One out of these 18 cases was re-admitted at the age of 3 months with symptoms of recurrent fistula (accounted for later). Seven of the cases had to be re-admitted later for dilatation therapy of increasing stricture formation at the site of the anastomosis, most frequently at 8 to 15 months of age, i. e. at a period when transition to solid food had been attempted. A few of the infants were admitted as emergencies with foreign bodies impacted in the stricture and on oesophagoscopy bits of meat, scraps of paper etc. were removed. All these patients were helped by treatment with bougies or other forms of dilatation therapy. The remaining 10 cases have been followed-up for a shorter or longer period and have not experienced any difficulty in swallowing or other sequelae of their anomaly but one of them died at the age of two years from another cause (untreated congenital heart disease, Steno-Fallot's disease, as mentioned previously.)

In six cases the post-operative course was, on the whole, uneventful but stricture which required treatment developed already during the first period of hospitalization. Three of these patients could be discharged following treatment with bougies already at the age of 1½—3 months while the remaining cases had to be detained in the Department for continued therapy for six months to one year. One of these cases had, in addition, persistent stridor and was operated upon at the age of six months for a subclavian artery with an abnormal course. Following resection of this artery, the stridor disappeared. Two out of the six infants died suddenly at home a few months after discharge. Although no definite information is available, it appears reasonable to presume that they died from aspiration and suffocation as a sequel of the stricture.

Insufficiency of the Sutures.

Insufficiency of the sutures in the oesophageal anastomosis occurred in 11 cases. In three cases the anastomosis was established under considerable tension on account of a large diastasis but in the remaining eight cases the anastomosis was considered satisfactory and in one case the con-

ditions were so favourable that a 2-layered anastomosis could be made. In all cases the insufficiency of the sutures developed within the first week after operation.

Five infants died within a few days as a consequence of pulmonary complications connected with the leakage of the suture line. All developed oesophago-pleural leakage. One of the cases had been operated upon via a retropleural approach and the remainder via transpleural approach.

Two cases did not die until after a couple of weeks. In one case, an oesophago-cutaneous fistula had developed but the actual cause of death was probably a recurrent fistula which was not recognized until at autopsy. The other case was complicated by situs inversus and coarctation of the aorta. In both of these cases, the transpleural approach had been employed.

Four patients survived the sequelae of insufficiency of the sutures. One case, in which the retropleural approach had been employed, developed an oesophago-cutaneous fistula which closed spontaneously after approximately 14 days so that the patient could be discharged after 1½ months. This patient was re-admitted shortly afterwards with a severe stricture which finally had to be resected by re-operation. Following this intervention, also, the patient required prolonged treatment for stricture but he is now thriving at the age of seven years. In two cases oesophageal leakage occurred which later became converted into an oesophago-cutaneous fistula. In one of the cases, the retropleural approach had been employed. In both cases the fistula closed spontaneously 1½—3 months after operation but one of them developed a recurrent fistula later (see below) while the other could be discharged at the age of 7½ months following prolonged dilatation treatment. Finally, in one case the leakage from the oesophagus ceased spontaneously after drainage for a few days but prolonged treatment for stricture was necessary.

Leakage of the tracheal fistula was observed in one case only. This manifested itself by pressure pneumothorax on the day after operation and the infant died 2 days after the operation from this complication.

Recurrent Fistula.

The most dangerous of the post-operative complications is recurrence of the oesophago-tracheal fistula as the condition is difficult to recognize and, despite re-operation, is associated with a high mortality.

As mentioned previously, this complication is not mentioned in the majority of accounts but, on the other hand, in the materials in which a comprehensive analysis is given it occurs as frequently as in the present material. Shaw found recurrent fistula in eight out of 54 cases and Sieber as many as seven out of 36 cases submitted to radical operation.

The authors of the present paper have observed this complication in nine cases. In three cases it was not demonstrated until at autopsy. These all died 1—2 weeks after operation but it must be assumed that the fistula and the subsequent pulmonary complications were the actual cause of death in all three cases. In the six remaining cases, the fistula was recognized, re-operation was undertaken and two patients were thus saved. In one case, formation of the recurrent fistula was preceded by suture insufficiency with an oesophago-cutaneous fistula, however, with a long free interval. In another case, preceding dilatation treatment possibly contributed to the fistula formation. All the remaining cases showed the following course: after an uneventful postoperative period varying from 14 days to three months, feeding difficulties consisting of coughing and attacks of cyanosis in connection with meals began to develop. In the cases in which feeding was undertaken via a gastrostomy, cough and cyanosis occurred when the stomach became distended and milk could then be aspirated from the trachea.

The etiology is probably similar in all cases. It is presumed that the fistula has been preceded by a leakage from the oesophagus or trachea with the formation of a little abscess cavity between the two organs. When this abscess, sooner or later, ruptures into the other organ, the fistula is re-established. In one case, such a cavity was successfully demonstrated radiologically (Figure 4)

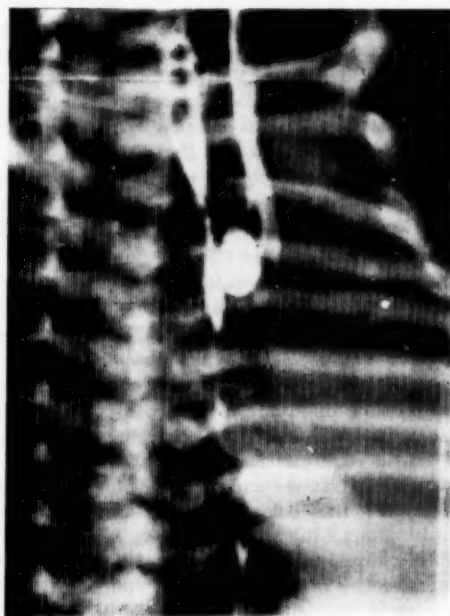


Fig. 4.

Recurrent fistula with abscess cavity between oesophagus and trachea.

and at re-operation, in other cases, the remains of abscesses were found between the two organs.

It has not been possible to decide from which organ the leakage originated. It is, however, possible that in some cases the resection was not close enough to the trachea so that a remnant of the fistula remained as a little cul-de-sac in which stagnation of secretion led to abscess formation. This etiology appears probable, at any rate, in the cases in which the primary post-operative course was uneventful.

The symptoms are characteristic when they are known and one is on the alert to recognize them. Difficulty in swallowing despite free passage in the oesophagus constitutes the main symptom in these infants. Attempts at drinking produce immediate coughing, ronchi and attacks of cyanosis. In connection with this, characteristic distension of the abdomen occurs as air is forced into the stomach via the fistula during crying and coughing. Particularly in cases in which gastrostomy had been performed this could be observed as air under considerable pressure streamed out through the gastrostomy tube when it was opened. As mentioned previously, gastrostomy cannot prevent the attacks of coughing as the stomach contents may easily be regurgitated and flow over into the trachea through the fistula.

In all cases, an attempt was made to verify the diagnosis by X-ray examination but in four cases only could the fistula be demonstrated. In recent cases a special technique described by Sieber was employed: a catheter is passed into the oesophagus while screening the patient until the point is at the level of the anastomosis and through this an aqueous solution of radio-opaque medium is injected while varying the position of the infant. With some experience and care the fistula may be demonstrated in this manner. Employing this technique it may be ensured that the radio-opaque medium does not reach the upper segment of the oesophagus and thus overflow into the trachea which would, naturally, obscure the picture. (See also Gudbjerg & Gertz).

When the diagnosis has been established, re-operation should be undertaken as soon as possible. The general condition of these infants deteriorates rapidly. If the general condition is already so poor that re-operation is not considered advisable simple gastrostomy does not suffice. The slightest distension of the stomach may cause regurgitation and subsequent flow of food into the trachea and bronchi. Recently, when gastrostomy has been indicated on account of complications, the authors have performed a double gastrostomy, as described by Pettersson, whereby one catheter is introduced through the pylorus into the duodenum while another is placed in the stomach near the cardia. Suction applied to the latter catheter prevents regurgitation.

The actual operative intervention in recurrent fistula is difficult. As a consequence of the preceding inflammation, the oesophagus and trachea are closely adherent and it is difficult to avoid injury to them during the sharp dissection necessary. In all cases complications in the form of suture insufficiency led to death following re-operation and one of the surviving cases required prolonged treatment of a severe stricture of the oesophagus.

CONCLUSIONS

The majority of the factors which according to the above influence the operative result are beyond our control. Thus other malformations, particularly malformation of the heart, cause considerable deterioration of the prognosis. The general condition on admission, particularly the degree of the pulmonary complications, is also an uncontrollable factor but here the possibility of pre-operative therapy exists. Although it is not evident from the figures in the present material it is of the greatest significance that the diagnosis be established as soon as possible after birth and that transfer to a paediatric department with access to surgical service is undertaken as rapidly as possible. When the malformation is borne in mind, it is easy to diagnose. Probing of the oesophagus will, as a rule, suffice and X-ray examination with radio-opaque media should be avoided.

The only factor where there is an actual possibility of improving the results is the operative technique. The many cases of recurrent fistula and leakages suggest that the operative technique may be improved.

Firstly, the approach. If it were possible to estimate in advance the diastasis between the two segments of the oesophagus, the extrapleural approach would probably be preferred in those cases in which the diastasis was great and tension might be anticipated. This is, however, only possible in the cases in which no oesophagotracheal fistula is present and in which anastomosis is practically excluded in advance. With the experience which the authors of the present paper have gained, they consider the transpleural approach, which in addition offers so many other advantages, to be the method of choice.

Secondly, the technique of establishing the anastomosis. Attempts probably be made to construct the oesophageal anastomosis, without any tension by mobilizing the two segments adequately and the fistula should be obliterated as close to the trachea as possible so that formation of a cul-de-sac is avoided. A flap of pleura between the two organs is probably of value. If possible, an attempt should be made to avoid making the anastomosis at the level of the tracheal fistula. In cases where the diastasis is considerable, it may be safest to decide upon a two-stage operation and in the first stage only open the upper segment of

the oesophagus on to the neck while the lower segment is closed.

Finally, drainage. In this connection it is recommended that, a drain be laid right in to the anastomosis as the forms of drainage hitherto employed frequently have proved inadequate in case of complications.

SUMMARY

The total material of cases of atresia of the oesophagus admitted for treatment to The Paediatric Department, The University Hospital, Copenhagen, since 1948, a total of 67 cases, is reviewed with particular reference to postoperative complications and the causes of death among the 52 cases subjected to radical operation. The total mortality was 58 per cent while the mortality among the cases which underwent radical operation was 46 per cent. The birth weight and age at operation do not appear to exert any decisive effect on the prognosis in this material. Complications related to the operative technique constituted the greatest group among the causes of death, followed by pulmonary complications and malformations of the heart. Recurrence of the oesophagotracheal fistula was seen in no less than nine cases. Six of these cases were submitted to re-operation but four died following operation and three died without the diagnosis having been established. Among the surviving patients, stricture of the oesophagus occurred in a number

of cases but in practically all the cases the stricture disappeared following dilatation treatment and, by and large, the patients have thrived well and are developing normally. On a basis of the experience gained, an attempt is made to draw conclusions as regards improvement of the operative technique.

References:

- Clatworthy, H. W.: *Pediatrics*. 1955; 16: 122.
 De Boer, Arthur & W. J. Potts: *Surg. Gyn. Obst.* 1957, 104: 475.
 Gertz, T. Cl.: *Acta Paed.* 1950, 37: 391.
 Gross, R. E.: *The Surgery of Infancy and Childhood*. 1953 (Saunders Philadelphia.)
 Gudbjerg, C. E. & T. Cl. Gertz: *Acta Radiol.* (in press).
 Haight, Cameron: *Ann. Surgery* 1952; 136: 717; *J. Thor. Surg.* 1957, 34: 141.
 Humphreys, G. H., B. M. Hogg & J. Ferrer: *J. Thoracic Surg.* 1956, 32: 332.
 Koop, C. Everett, W. B. Kiesewetter & J. Johnson: *Surg. Gyn. Obst.* 1954, 98: 687.
 Leven, N. L., R. L. Varco, B. G. Lannin & L. A. Tongen: *Ann. Surgery* 1952, 136: 701.
 Petterson, G. & G. Haglund: *Acta Chir. Scand.* 1951, 102: 327.
 Sandegaard, E. 1957 (in press).
 Secher, O., B. Fl. Haxholdt & T. Vilstrup: *Nord. Med.* 1955, 54: 1456.
 Shaw, R. R., D. L. Paulson & E. K. Siebel: *Ann. Surgery* 1955, 142: 204.
 Sieber, W. K. & B. R. Girdany: *Pediatrics*. 1956, 18: 935.

PRESACRAL AND SACRAL TUMOURS IN CHILDREN

By ERIK ROSTGAARD CHRISTENSEN

Presacral and sacral tumours in children have been a subject of great interest throughout the years and the literature on the subject is, therefore, extensive. The majority of works are, however, casuistics and only few comprehensive accounts are available. As the diagnosis and treatment may be difficult and are of vital importance, a review of 11 cases will be presented here.

The first known case of a sacral tumour is depicted in a Babylonian tablet from about 2,000 B. C. and is kept in the Royal Library in Nineveh (Balantyne 1894). The inscription on this tablet states: "When a woman gives birth to an infant with three feet, two in the normal positions and the third between them, there will be great prosperity in the land." The first successful

operative removal of such a tumour was undertaken by Stanley in 1841 (quoted from Lister 1955).

Presacral and sacral tumours are frequently termed sacro-coccygeal as they are, as a rule, intimately related both to the sacrum and the coccyx. The great rarity of these tumours appears, inter alia, from a material of 343 tumours from The Babies' Hospital in New York from 1935—51, as only 9 of these were sacral teratomata (Andersen 1951). Similarly, only 1 per cent of all tumours in The Children's Memorial Hospital in Chicago in 1918—48 were sacro-coccygeal teratomata (Riker & Potts 1948). Whittaker & Pemberton (1938) calculated the incidence of presacral tumours to 1:40,000 of patients admitted to hospital. This corresponds to the findings of Ross (1948) who found an incidence of 1:46,000. Chaffin (1937) calculated the incidence of presacral teratomata to 1:35,000.

From The Department of Paediatrics (Head: Professor P. Plum) and The Paediatric Surgical Unit (Head: C. C. Winkel Smith), Rigshospitalet, University of Copenhagen.

Whereas in adult patients many different forms of tumour are encountered in the sacral region (the reader is referred to Mayo (1953), Myers (1954) and Rowe (1956) as regards the classification of sacral tumours in patients of all ages) so that the differential diagnosis may be difficult, tumours in this region in children are predominantly teratomata. Neurogenic tumours are encountered less frequently and other forms of tumours are very rare. As greater or lesser quantities of neurogenic tissue are frequently present in teratomata, many authors do not differentiate sharply between the two main groups so that tumours of neurogenic origin have, in several instances, been erroneously termed teratomata.

Table I.
Classification of Sacro-coccygeal Tumours in Children.

A. Teratomata	
B. Neurogenic Tumours	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Ependymomata</div> <div style="display: inline-block; vertical-align: middle;">Neuroepitheliomata</div> <div style="display: inline-block; vertical-align: middle;">Neurinomata</div> <div style="display: inline-block; vertical-align: middle;">Ganglioneuromata</div> <div style="display: inline-block; vertical-align: middle;">Chordomata</div> <div style="display: inline-block; vertical-align: middle;">Fibromata, Fibrosarcomata,</div> <div style="display: inline-block; vertical-align: middle;">Fibromyomata</div> <div style="display: inline-block; vertical-align: middle;">Lipomata</div> <div style="display: inline-block; vertical-align: middle;">Myomata, Adenomata,</div> <div style="display: inline-block; vertical-align: middle;">Leiomyosarcomata</div> <div style="display: inline-block; vertical-align: middle;">Haemangioendotheliomata</div> <div style="display: inline-block; vertical-align: middle;">Chondromata, Chondro-</div> <div style="display: inline-block; vertical-align: middle;">sarcomata</div> <div style="display: inline-block; vertical-align: middle;">Osteomata, Osteosarcomata,</div> <div style="display: inline-block; vertical-align: middle;">Giant Cell Tumours</div> <div style="display: inline-block; vertical-align: middle;">Ewing's Sarcoma</div> </div>
C. Rare Tumours	

Teratomata in children are most frequently localized to the sacro-coccygeal region while in adult life they are most frequently localized to the gonads or the anterior mediastinum (Andersen). According to Himwich (1922) the average age for the occurrence of teratomata is 41 years. The only Scandinavian account is from Helsinki where Sulamaa & Ahvenainen (1949) in the course of only 1½ year admitted 8 cases to the paediatric surgical unit. Gross et al. published in 1951 an account of 41 cases from The Children's Hospital in Boston admitted during the years 1920—50. Simultaneously, in a meticulous review of the literature, Gross found a total of 426 cases of sacral teratomata prior to 1951. Among other comprehensive accounts, that of Gwinn et al. (1955) who found 18 cases of presacral teratomata in the Mayo Clinic from the years 1907—53 must be mentioned. From Chicago, Riker & Potts published 7 cases in 1948 from a period of 30 years.

ETIOLOGY AND PATHOGENESIS

Teratomata. Numerous theories concerning the etiology of sacral teratomata have been propounded in the course of time. Many of these must mainly be regarded as curious philosophical

deliberations with dubious scientific foundation. Only the most important and most plausible theories will, therefore, be mentioned here while the interested reader is referred to Sulamaa et al. and Pflüger (1956) who give a comprehensive review of the etiological possibilities. By and large, two principle points of view must be considered. One is shared particularly by German authors of the past who consider a teratomata to be a sort of rudimentary twin which develops either by parthenogenic development of the individual's own germinal cells (monogerminal development or foetal rest, Borst (1898) and Engelmann (1904)), or from a blastoma, resulting from segmentation at an early stage, which commences its own development and later becomes incorporated in the foetus (bigerminal development or foetal inclusion, Linsner (1901)). Parallel with this, other authors regard teratomata as malformations developing from the primitive embryonic layers (Heidenhain (1923), Hartenstein (1936) and Schram (1910)). The other principle point of view which was propounded first by Hündling (1924) and has since become the dominating viewpoint of the more recent and particularly Anglo-American authors is the following: not only teratomata but also the other forms of sacral tumours have developed from primordial pluri- or totipotent cells which are particularly numerous in the sacral region in foetal life. This region forms a collective site for the neural canal, the vertebral column, the segmental striped musculature and the hind gut. The primitive streak (Henson's node), similarly, was originally situated here (Willis 1950) in addition to the primitive gonad cells which wander forwards alongside the hind gut. Congenital anomalies or embryonic vestiges frequently occur in several of these tissues and may form the starting point for the various types of presacral tumours.

Ependymomata originate from the filum terminale and grow out presacally through the sacral foramina (Gross).

Neurinomata originate from the neurilemma of the pelvic nerves.

Ganglioneuromata which prior to 1956 had only been observed in 13 patients under the age of 20 years with a presacral localization (Rowe 1956) are derived from the sympathetic nerve plexuses in the pelvis.

Chordomata originate from vestiges of the notochord. Prior to 1948, only 135 cases with various localizations along the vertebral column had been described (Gentil & Coley 1948). According to Dahlin (1952), 54 per cent of chordomata are localized to the sacro-coccygeal region.

PATHOLOGICAL ANATOMY

Teratomata consist microscopically of tissues from all three embryonic layers, as all types of

tissue may occur with the exception of heart muscle and placental tissue which have never been observed. More rarely, fully developed parts of organs such as teeth and bones are encountered. Gross found teeth in 10 per cent of his material. Montgomery (1922) described a scapula and Brines (1934) found arm-bones and a hand. The histologically malignant tumours which most frequently correspond to the biologically and clinically malignant tumours are of immature type and are frequently termed dysembryomata or malignant embryomata, particularly in the Germanic literature where the term "embryoma" is employed as synonymous with "teratoma".

Ependymomata are classified according to Kernohan (1937) into 4 types, viz, papillary, myxopapillary, epithelial and cellular types. Kernohan later (in 1949) established 4 degrees of differentiation according to the degree of histological malignancy. The tumour grows only slowly but is nevertheless frequently clinically malignant (particularly when the histological differentiation is poor), as following operative removal there is a great tendency to local recurrence (Myers).

Neurinomata consist of mature nerve cells and neurofibrils. They are benign and give rise neither to recurrences nor metastases.

Neuroepitheliomata consist of primitive spongioblasts which are frequently arranged in rosettes and frequently show cuticular formation and cilia. Kernohan classifies these as ependymomata of the 4th. degree, very immature and malign both histologically and clinically.

Ganglioneuromata grow only slowly as fleshy masses. They consist of nerve cells in various degrees of differentiation and glial cells in a stroma of fibrous tissue and neurofibrils. According to Rowe, metastases occur in 18 per cent of cases.

Chordomata consist of large polygonal cells arranged in clumps or cords in a myxomatous matrix. This tumour occurs particularly in adult males and is rare in children. The tumour grows slowly, is not sensitive to X-ray radiation and recurs readily after removal. There is always invasive growth into the sacrum and for this reason extirpation of the sacrum together with the infiltrated soft parts is important (Mixer 1940). Distant metastases have been described (Whittaker & Pemberton).

MATERIAL

The material comprises 11 patients who were admitted to the Department of Paediatrics, The University Hospital, Copenhagen, during 1949-57. As regards 9 of the patients, primary intervention was undertaken immediately after birth or during the first years of life, while the remaining 2 patients had previously been operated upon elsewhere.

A. Cases in which Primary Operation was Performed. All the children who underwent primary operation were full-time female infants without other malformations. In 4 of the cases, the delivery had been very long and difficult. It was necessary to deliver one of the children by Caesarian section after a labour lasting 2½ days on account of threatening intra-uterine asphyxia (see Figure 1). In another case, which will be briefly accounted for, the tumour was removed via Caesarean section while the living child was thereafter delivered per viam naturalis.

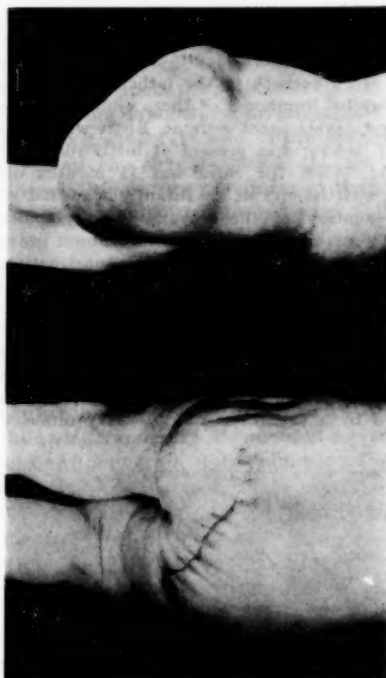


Fig. 1.
Benign teratoma necessitating Caesarian section.
Tumour removed a week after birth?

Female infant, born April 25, 1957. There was a history of 5 pairs of twins among the nearest relatives. The patient was number 3 of 3 siblings. The circumference of the mother's abdomen exceeded that found in the previous pregnancies. Labour commenced 2 weeks prematurely in a private nursing home where the infant was born with head, upper arms and body to the umbilicus and thereafter delivery came to a standstill. The mother was admitted in labour to The University Hospital. The child was alive and crying. Caesarean section was performed. A sacral tumour, exceeding the size of the infant's head, coarsely lobulated and partially covered with skin, was extirpated in utero after which the infant was delivered per viam naturalis. Wound toilet and suture were carried out by the paediatric surgeons. The post-operative course was uneventful. X-ray of the pelvis did not reveal any abnormality. Histology: mature teratoma with cartilage, calcified tissue, glial tissue and cavities lined with cystic epithelium.

Pathological examination revealed that eight of the tumours were teratomata and all were visible in the sacro-coccygeal region at birth. Five of these were removed during the first week of life with satisfactory results, as all children survived without recurrences. Three patients, however, were not admitted and treated until the ages of 15–24 months. In one of these cases the infant died shortly after operation from acute cardiac arrest but the disease would undoubtedly nevertheless have terminated fatally as microscopic examination of the tumour revealed that it was composed of extremely malignant carcinomatous and mesoblastic tissue.

Female infant, born April 26, 1951. There was a history of twins both in the father's and in the mother's family. Number 3 of three siblings. Pregnancy, birth and development normal. Birth weight 3,000 g. A sacral tumour was present at birth and grew with the child. When the child was 15 months old, the tumour was the size of an infant's head and reached the promontory of the sacrum. The symptoms exhibited were: waddling gait, involuntary passage of faeces and urine, strangury, pyuria, constipation, pain on defaecation and blood in the faeces. The residual urine was 100–200 ml. Blood urea: 41 mg per cent. X-ray examination revealed no calcification in the tumour but destruction of the lower 3 sacral vertebrae and left-sided hydronephrosis. Blood transfusion was established pre-operatively. The tumour was approached by a sacral incision. Twenty minutes after

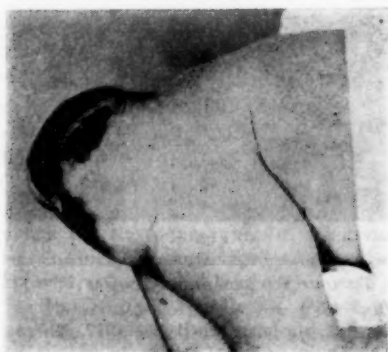


Fig. 2.
Large sacral teratoma on a newborn child.
Notice the ulcerated skin.

operation sudden cardiac arrest and death. Histology: immature malignant teratoma (carcinoma and mesoblastoma).

In only one of the infants who was operated upon primarily the tumour was an ependymoma. As the case history differs from that of teratomata as regards symptomatology and treatment it will be accounted for:

Female infant, born Febr. 13, 1950. No familial predisposition to twinning. Only child. Pregnancy and delivery normal. Birth weight 3,250 g. The infant was admitted at the age of 2 months to another hospital

with retention of urine and pyuria and was treated with indwelling catheter and a sulphenamide preparation (Lucosil). The patient was then transferred to The University Hospital where a large pelvic tumour reaching up to the promontory of the sacrum was found which was pressing the rectum forwards and was adherent to the sacrum. The tumour, together with the coccyx, was removed by a combined abdomino-sacral intervention. The post-operative course was uneventful. Micturition was normal on discharge from hospital. Cystoscopy: vertical course of the urethra. X-ray examination: ureters slightly dilated, pelvic bones normal, distance between rectum and sacrum increased with slight impression corresponding to the ampulla. Blood urea: 81–24.5 mg per cent. Histology: ependymoma of cellular type. Follow-up investigation: see later.

B. Cases in which Secondary Operation was Performed. Both of the cases which underwent secondary operation were male infants and both have died. One of the cases presented a teratoma in which malignant changes had developed in the tissues remaining after primary intervention. The other tumour was an ependymoma which, similarly, recurred and caused the death of the infant on account of metastases in the liver after an unsuccessful attempt at radical operation. Both of these case histories will be briefly reviewed as they illustrate admirably the value of the correct primary treatment for the prognosis in such infants.

Male infant, born April 16, 1941. History of twins in the father's family. Number 3 of four siblings. Pregnancy, delivery and development normal. Birth weight 4,000 g. Admitted to another hospital at the age of 5½ years with attacks of pyrexia and sacral pains. A large sacral tumour was removed by sacral intervention. Histology: malign neuroepitheliomatous tumour with complicating necrosis. Admitted at the age of 9 years to The University Hospital in good general condition but with a large recurrence of the tumour on the anterior surface of the sacrum without invasive growth. No metastases in the thorax nor bones. The tumour and the coccyx were removed by a combined abdominosacral intervention. Histology: ependymoma of epithelial type. Two months after operation, incontinence of faeces. Later, attacks of pain in the epigastrium and under the right rib-margin developed. Re-admitted to The University Hospital at the age of 10½ years with a large recurrence of the tumour, completely filling the true pelvis and with invasion into the sacrum. No metastases were present in other bones nor in the thorax. On laparotomy, extensive metastases in the liver were found and further therapy was therefore abandoned. Microscopic examination of a specimen from the liver: metastases from ependymoma. The patient's condition gradually deteriorated and he died at home 15 months after discharge from hospital.

Male infant, born Oct. 25, 1955. No familial predisposition to twinning. Only child. The delivery was terminated by expression. Admitted at the age of 2 days to another hospital with a cystic sacral tumour extending high up in the pelvis; for this reason, a small fragment of tumour tissue could not be re-

moved at operation. Histology: cystic unilocular lymphangioma. Acute retention of urine occurred at the age of one year. Cystostomy was performed and the child transferred to The University Hospital. The general condition was good but a large recurrence of the tumour filling the entire pelvis was found. This had reduced the rectum to a narrow slit and had raised the pelvic floor to above the level of the symphysis. Urography: bilateral hydronephrosis and hydroureter. During a prolonged operative intervention an attempt was made to remove the tumour radically and the coccyx was excised. Histology: malignant teratoma with mesoblastic tissue. The patient was transferred on the 10th. post-operative day to The Radium Institute where 545 r. were administered to the abdomen and true pelvis in the course of 25 days. X-ray treatment had to be discontinued on account of increasing weakness, pyrexia and attacks of subacute ileus. The patient died at home 3 days after discharge from The Radium Institute.

RESULTS

Treatment.

The treatment employed in this material consists of immediate radical operation. As the intervention was undertaken immediately after birth or in any case within the first years of life, all the measures of adequate fluid therapy necessary in the surgery of infants were meticulously carried out. In all cases, the coccyx was resected. This undoubtedly gives a better approach to the field of operation and possibly reduces the risk of recurrence. In 19 cases in which resection of the coccyx was not undertaken, Gross found recurrence in seven patients while in 10 cases in which resection was performed, no cases of recurrence took place. Finally, Gross found in all patients microscopically demonstrable invasion of the coccyx in the form of small islets of cells ("cell-nests").

In eight patients the tumour could be removed radically solely through a sacral incision while an abdomino-sacral technique was necessary in three patients in whom the tumour showed considerable intrapelvic extension. The surgeon should always be prepared to undertake a combined intervention in these children.

Malignancy.

The tumour was malignant and was responsible for the death of the child in three cases which are all accounted for above. Two of the patients who died were operated upon on account of recurrence which developed after a primary intervention undertaken in another hospital, in one case immediately after birth and in the other at the age of five years. These children developed malignant recurrences one and four years after the operation, respectively, and the course of the disease thus emphasizes the necessity that the primary intervention be radical.

Further, the malignancy appears to depend upon the age of the infant at operation as these

three children were not admitted to The University Hospital until $1\frac{1}{2}$ — $9\frac{1}{2}$ years of age while the infants who were operated upon immediately after birth survived and escaped recurrences.

Follow-up Examination.

The eight surviving patients were followed-up in June-July 1957. The longest period of observation was ten years and the shortest three months. No sign of recurrence was found in any of the patients and the scars were cosmetically satisfactory. One patient had had periods of slight constipation but these disappeared following digital dilatation and the rectum was found to be of normal dimensions. Another patient who was operated upon for a large intrapelvic ependymoma, complained of pollakisuria and stress incontinence but laboratory investigations and a thorough instrumental and radiographic investigation of the urinary tract did not reveal any abnormality. In the remaining patients there were no complaints whatsoever on follow-up examination.

DISCUSSION

Familial Predisposition to Twinning.

In eight of the patients, one of whom suffered from an ependymoma, twin births had occurred in the near family: two to five pairs of twins were known, frequently throughout several generations. Although the total number of normal births in all the branches of the families concerned is not known, this incidence of twin births must be regarded as significantly above average. In the literature, only sparse information concerning predisposition to twins among patients suffering from sacral tumours is available. Hickey (1954) encountered familial twin births in one out of nine patients, while Gross encountered twin births in 33 per cent but as Gross only succeeded in contacting about half of the patients, *viz.*, 23 out of 40, the figure for twins in his material is probably considerably higher.

Pregnancy, Delivery and Perinatal Period.

Two mothers complained of abnormally increased circumference of the abdomen during the latter months of pregnancy (*cf.* the frequent occurrence of hydramnios in association with congenital malformations). Apart from this, the pregnancies ran a normal course. Nicola (1953) described hydronephrosis in a mother on account of pressure from the enlarged uterus. The condition may lead to abortion, most frequently in the third month, an observation first recorded by Ballard (1923). Large tumours frequently give rise to difficulties in the delivery (Hewertson 1903, Scendi 1933, Brenner 1935, Kraatz 1935 and Neal 1943). In four patients in the present material, the delivery was prolonged and difficult. Two of them were delivered

with the aid of Pituitrin combined with expression in one case while the remaining two cases were delivered by means of Caesarean section. One of the cases of Caesarean section, quoted above, is the first recorded in the literature in which the tumor was removed via the uterus and a living child delivered per vaginam. In cases recorded previously in which delivery came to a standstill on account of a large incarcerated sacral tumour, manual delivery or forceps delivery was attempted first but such considerable violence was employed that the child was still-born. Levant (1932) recommended lumbar anaesthesia for the mother in cases of prolonged and painful deliveries.

All of the patients in this material were full-time infants and survived the perinatal period. This finding contrasts with that of Ewing (1940) who found that $\frac{1}{3}$ of such infants were stillborn and that 90 per cent of the remainder died within the course of a few days. None of the infants in the present material had other deformities although several authors have described simultaneous occurrence of such deformities (Gross, Pflüger, Riker). These authors found spina bifida, atresia of the anus, cleft palate, club foot and malformation of the genitals in a number of their patients.

In the majority of large materials, girls preponderate to an average of 75 per cent. The present material is in accordance with this observation as nine of the cases were girls.

Pathological Anatomy.

Pathologically, nine of the tumours were teratomata while two were ependymomata. Microscopic examination of seven of the teratomata revealed mature, well differentiated types of connective tissue, cartilage, bone, intestinal epithelium, glial tissue and ganglion cells, while the two remaining teratomata showed malignant changes and consisted of immature and primitive mesenchymal tissue. Only these two patients died, thus presenting examples of agreement between histology and clinical course which, according to the literature, (Gross, McBurney) is not always the case. In one of the patients, the clinical diagnosis was a sacral teratoma while the preliminary histological diagnosis was myelomeningocele. The microscopic diagnosis was later after comparison with the clinical picture, corrected to "teratoma with a structure resembling a myelomeningocele". A corresponding borderline case was reported by Dorothy Anderson in 1951.

One of the ependymomata was of cellular type according to Kernohan's classification and was clinically benign while the other ependymoma was of epithelial type and led to death with metastases in the liver which have not hitherto been described in a child. Recently, however, two cases of metastasizing ependymomata in

young adult males have been reported (Weiss 1956, Sharma 1956). For some unknown reason, ependymomata do not metastasize outside the central nervous system but they show a great tendency to recurrence and may lead to the death of the patient by invasive growth as is described by several authors (Gross, Lovelady, Gwinn). Gross found that incidence of recurrence and malignancy was four times as great when the neural elements (ependymal tissue, neurofibrils and chorion epithelium) predominated on microscopic examination.

Malignancy.

In three of the infants in the present material, the tumours were malignant. This figure corresponds to those stated in the literature available as the various authors give the malignancy as from 0 to 66 per cent (Sulamaa et al. 0 per cent, Pack et al. "very rarely", Chaffin 9 per cent, Lisco 15 per cent, Rawitch & Smith 17 per cent, Lister 20 per cent, Riker & Potts 66 per cent). The malignancy appears to increase with the age of the child as all three of the children who died were not operated upon in The University Hospital until between $1\frac{1}{2}$ and $9\frac{1}{2}$ years of age; where two of them are concerned, a primary operative intervention had been undertaken previously elsewhere. This state of affairs is convincingly demonstrated by an investigation undertaken by Hickey based upon 53 cases selected from the literature. 38 of the children were operated upon before the age of four months. If operation be undertaken before the child attains this age, only 5 per cent of the tumours will be malignant. If the tumour is not discovered until after the age of 5 years it is practically never malignant as malignant tumours would have led to a fatal issue prior to this age. Palumbo (1951), however, described a case of sacral teratoma where the patient died of malignant recurrence 34 years after the primary intervention.

Clinical Findings.

The tumour grows, as a rule, with the child so that in older children, walking and movements may be compromised. This was the case in two of the patients in the present material. Rapid growth and malignancy are, therefore, not synonymous (Riker & Potts) but pressure symptoms may arise. Numerous authors have described retention of urine, occasionally associated with uraemia (Brown (1950), Goodwit (1935), Gross, Gwinn, Renner (1935), Stewart (1930), Woodruff & Begner (1945)). Compression of the rectum may cause severe constipation suggestive of congenital megacolon. Four of the patients in the present material showed stasis in the urinary tract, raised blood urea and pyuria. Two patients had residual urine and severe constipation.

The skin overlying the tumour is frequently ulcerated (see Figure 2) and infection may develop either during delivery, should a cyst rupture, or later from the rectum. In older children and adults, fistulae have been described opening, as a rule, on to the skin or, more rarely, into the rectum or vagina (Ewell 1942, Keen 1906). A fistula to the spinal canal may cause meningitis (Hamby 1944). Rhoden (1944) described a singular case of pubertas praecox on account of hormone-producing androgenic tumour tissue.

The most important diagnostic aids to ascertain the intra-pelvic extent of the tumour and its fixation to the rectum or invasion of the sacrum are rectal exploration, straight X-ray examination and barium enemata. The results of these investigations are of great value in the choice of method of operation as they decide whether a sacral incision will suffice or if the more extensive combined abdominosacral intervention must be resorted to. In three patients calcification in the tumor was demonstrated radiologically and in one patient in whom the tumour was removed during delivery, histological evidence of calcification was observed. Calcification was thus seen in a total of four patients. This corresponds to the findings of Gross and Gwinn who both found calcification in 40 per cent. In an isolated patient, there was radiologically visible destruction of the sacrum which is, as a rule, evidence of malignancy (Gross). According to Mayo, teratomata give erosion of the anterior surface only of the sacrum while the neural tumours, predominantly ependymomata, cause sharply delimited erosions of the sacral canal. Compression of the ureters may be demonstrated by intravenous urography.

CONCLUSIONS

Previous experience and the present material demonstrate the importance of operation immediately after birth on all infants with presacral and sacral tumours. At this stage, complications in the form of infection, malignancy and compression symptoms have not yet developed. Only in small premature infants is preliminary treatment of the general condition necessary and it is important to establish a pre-operative intravenous infusion in view of adequate fluid and blood administration. It is of decisive importance for the result of treatment that the coccyx be removed and the intervention carried out as radically as possible as malignancy may develop in the residual tumour tissue.

SUMMARY

A brief review of the literature concerning presacral and sacral tumours in children is supplemented by an account of personal experience of eleven cases, treated during the period 1949—1957. Two patients were submitted to secondary operation and both have died. Nine patients

underwent primary operation. Six of these were operated upon immediately after birth and are alive. Three were operated upon at 1½—2 years of age and one of these has died. Nine of the tumours were teratomata and two were ependymomata. One of the patients with an ependymoma, who underwent secondary operation, was the first recorded case of an ependymoma in a child with metastases outside the central nervous system. Eight of the patients had histories of twins in the nearest family. In four cases the tumour obstructed delivery and in one of these, the tumour was removed in utero via Caesarean section while the infant was delivered per viam naturalis. The eight surviving patients were followed-up. No evidence of recurrence was found and the scars were cosmetically satisfactory. It is concluded that presacral and sacral tumours in infants should be operated upon radically with extirpation of the coccyx immediately after birth.

References

- Anderson, D. H.: Cancer 1951, 4: 890.
 Ballantyne, J. W.: A Quarterly Journal Of Antenatal Pathology. London 1894, Vol. 1. p. 133 (cit. after Lister).
 Ballard, P.: J. Med. Bordeaux 1923, 95: 1063.
 Borst, J.: Zbl. Path. 1898, 9: 499 (cit. after Sulamaa).
 Brenner, M.: Zentralbl. f. Gynäk. 1935, 59: 1650.
 Brines, R. J.: JAMA 1934, 103: 338.
 Brown, R. K. & E. C. Brown: Arch. Surg. 1950, 60: 535.
 McBurney, R. P., D. A. Johnson & R. B. Roy: Am. Surgeon 1955, 21: 1243.
 Chaffin, L.: Surg. Gynec. Obst. 1937, 69: 337.
 Dahlin, D. C. & McCarty: Cancer 1952, 5: 1170.
 Engelman, H.: Arch. Klin. Chir. 1904, 72: 442. (cit. after Sulamaa).
 Ewell, G. H. & R. Jackson: South Surg. 1942, 11: 855.
 Ewing, J.: Neoplastic Diseases. Saunders, Philadelphia 1940.
 Gentil, F. & B. L. Coley: Am. Surgeon 1948, 127: 432.
 Goodvit, E.: Am. J. Cancer 1935, 24: 617.
 Gross, R. E., W. H. Clatworthy & I. A. Meeker: Surg. Gynec. Obst. 1951, 92: 341.
 Gwinn, J. L., M. B. Dockerty & R. L. Y. Kennedy: Pediatrics 1955, 16: 239.
 Hamby, W. B.: Journ. of Neuropath. 1944, 3: 397.
 Hartenstein, H. J.: Kinderärztl. Prax. 1936, 7: 245.
 Heidenhain, L. & G. B. Grube: Z. Kinderhk. 1923, 36: 1.
 Hewertson, J. T.: Journ. of Obst. and Gynec. 1903, vol. 3 no. 3.
 Hundling, H. W.: Surg. Gynec. Obst. 1924, 38: 518.
 Hickey, R. C. & J. M. Layton: Cancer 1954, 7: 1031.
 Himwich, H. E.: Cancer Research 1921, 6: 261.
 Keen, W. W. & W. M. L. Coptin: Surg. Gynec. Obst. 1906, 3: 661.
 Kernohan, J. W. & E. M. Fletcher-Kernohan: Nerve and Ment. Dis. 1937, 16: 182.
 Kernohan, J. W. et al.: Proc. Staff. Meet. Mayo Clin. 1949, 24: 71.
 Kraatz, H.: Zentralbl. f. Gynäk. 1935, 59: 260.
 Levant, Rauna & Sureau: Boull. Soc. Obstr. Paris 1932, no. 2.
 Linser, P.: Beitr. Klin. Chir. 1901, 29: 388 (cit. after Sulamaa).
 Lisco, H.: Ann. Surg. 1942, 115: 378.

Lister, J.: Arch. Dis. Chil. 1955, 149: 65.
 Lovelady, S. B. & M. B. Dockerty: Am. J. Obst. and Gynec. 1949, 58: 215.
 Mayo, C. W., G. S. Baker & L. R. Smith: Proc. Staff Meet. Mayo Clin. 1953, 28: 616.
 Mixer, C. G.: Arch. Surg. 1940, 41: 408.
 Montgomery, A. H.: JAMA 1922, 78: 416.
 Myers, W. C.: Am. Surgeon 1954, 20: 1180.
 Neal, M. P. & J. P. Carlisle: South. Med. Journ. 1943, 36: 677.
 Nicola, S. P.: Minerva Gin. Tor. nov. 1953, p. 146.
 Pack, G. T. & R. Braund: Am. Surgeon 1942, 116: 76.
 Palumbo, L. T., K. R. Gross & R. E. Paul: Am. Surgeon 1951, 133: 421.
 Pflüger, H.: Chir. 1956, 27: 77.
 Ravitch, M. M. & E. T. Smith: Surgery 1951, 30: 733.
 Renner, R. R. & E. Goodvit: Am. J. Cancer 1935, 24: 617.
 Rhoden, A. E.: J. Clin. Endocrin. 1944, 4: 185.
 Riker, W. & W. J. Potts: Ann. Surg. 1948, 128: 89.
 Ross, S. T.: Am. J. Surg. 1948, 76: 687.
 Rowe, R. J. & D. T. Brook: Am. J. Surg. 1956, 92: 710.
 Sharma, K. O.: Indian Journ. Med. Science 1956, Vol. 10, p. 639.
 Schram, H.: Wien. Klin. Wschr. 1910, 55: 210 (cit. efter Sulamaa).
 Stewart, J. D., N. M. Allen & J. D. Craig: Surg. Gynec. Obst. 1930, 50: 85.
 Sulamaa, M. & E. K. Ahvenainen: Acta Chir. Scand. 1949, 197: 417.
 Szendi, B.: Arch. f. Gynäk. 1933, 154: 538.
 Weiss, L.: Cancer 1956, 81: 161.
 Whittaker, L. D. & J. de J. Pemberton: Ann. Surg. 1938, 107: 96.
 Willis, R. A.: The Principles of Pathology. London 1950.
 Woodruff, S. R. & J. A. Begner: J. Urol. 1945, 54: 177.

THE DIAGNOSIS OF LATENT MEGALOBLASTIC ANAEMIA

A COMPARISON BETWEEN THE ESTIMATION OF PLASMA VITAMIN B₁₂ AND THE SCHILLING TEST

By H. P. ØSTERGAARD KRISTENSEN, L. KORSGAARD CHRISTENSEN, TH. FRIIS and A. SØEBORG OHLSEN

With the introduction of reliable analysis methods for determination of plasma B₁₂ activity, it has become obvious that B₁₂ deficiency states can occur even in the absence of clinical symptoms (3, 8, 9) or symptoms which only manifest themselves by partial megaloblastic erythropoiesis (4).

A very low plasma B₁₂ value will, as a rule, indicate a lowered ability to absorb the vitamin. On the other hand, it is less certain to what extent moderately reduced plasma B₁₂ values are an indication that the organism cannot absorb the B₁₂ vitamin.

Therefore, in many cases the question will be whether it is justifiable to presuppose a latent perniciosiform condition on the basis of determination of the plasma B₁₂ level alone.

This is the problem which has been examined in the present work.

MATERIAL

The material comprises 16 patients. The indication for further examination of these persons has in all cases been the demonstration of a reduced plasma B₁₂ level (less than 150 µg/ml) or a B₁₂ level bordering on the normal (150 to 200 µg/ml). The patients concerned were selected from a larger material (examined by H. P. Ø. K.), the aim of which was to illustrate the plasma B₁₂ content in various non-haematological diseases. In the cases where low plasma B₁₂ values

were found, the patients' anamnesis and clinical condition were reviewed, and sternal puncture and other supplementary examinations were carried out. Where such tests suggested the presence of megaloblastic anaemia, the patient was omitted from the material.

Thus the material includes patients in whom low plasma B₁₂ levels have been found unexpectedly, and where no certain clinical or haematological signs of B₁₂ deficiency have been demonstrated. These patients were then subjected to tests in order to ascertain their ability to absorb vitamin B₁₂, using the Schilling procedure.

All the patients were found to have gastric achylia. None of them were vegetarians and none had clinical signs of sprue. The renal function, determined by serum creatinine concentration and specific gravity of urine, was normal in all cases.

METHODS AND CRITERIA

The plasma B₁₂ level was determined microbiologically by means of *Lactobacillus leichmanii* 313 (2, 7). The average B₁₂ concentration in a material comprising 175 control subjects in the ages 18 to 92 years was 392 µg/ml, ranging from 165 to 1135 µg/ml (Østergaard Kristensen 1956 and unpublished data). Only 3 per cent of the controls had concentrations of less than 200 µg/ml and only about 3 per cent above 750 µg/ml. In 44 patients with untreated pernicious anaemia, the average plasma B₁₂ concentration was less than 53 µg/ml, ranging from less than 20 to 165 µg/ml. Only about 5 per cent of these patients had concentrations of above 100 µg/ml.

From: Copenhagen County Hospital, Gentofte, Medical Dept. C. (Chief: M. Siggaard Andersen) and Institute of Pathology (Chief: A. Søbørg Ohlsen).

Patient no.	Sex	Age	Diagnosis	Hb. per cent.	RBC. mill./mm ³	Colour index	Serum-iron.	Plasma B ₁₂		Schilling test
								Single values	Mean	

Bone marrow: White system
 Bone marrow: Red system

Patient no.	Sex	Age	Diagnosis	Hb. per cent.	RBC. mill./mm ³	Colour index	Serum iron.	Plasma B ₁₂		Schilling test	Bone marrow: Red system	Bone marrow: White system
								Single values	Mean			
1	F	59	Obesity. Arthralgia.	94	5.0	0.88		<20	<20	1.9	Hyperplastic, normoblastic erythropoiesis. A few macroproerythroblasts. Good haemoglobinisation.	Maturation defect in hyperplastic myelocytic partly macrocytic system. No shift to the left in leucocytic series.
2	F	65	Psychoneurosis. Vascular hypertension.	83	3.9	1.01	0.125	40-80-70	63	2.8	Hyperplastic, normoblastic erythropoiesis. Sideropenic erythrocytes.	Hyperplastic myelocytic system with left shift. Moderate left shift in leucocytic series.
3	F	75	Gastroentero-anastomosis seqv. Emaciation. Hypoproteinaemia.	80	3.6	1.07	0.082	75-75-65-40	64	0.4	Hyperplastic, normoblastic erythropoiesis. Few macroproerythroblasts. Sideropenic erythrocytes.	Hyperplastic myelocytic system with left shift including myeloblasts. Moderate left shift in leucocytic series.
4	F	50	Hypochromic anaemia.	60	4.5	0.64	0.011	65-80-80-70-55-85	73	0.5	Hyperplastic, normoblastic erythropoiesis. Sideropenic erythrocytes.	Left shift comprising the myeloblasts.
5	F	69	Peritonitis encapsulata.	83	3.8	1.04	0.036	80-80	80	0.2	Normoblastic (Sternal puncture unsuccessful, mixed with perif. blood). Normoblastic erythropoiesis. Good haemoglobinisation.	Hyperplastic myelocytic system.
6	F	66	Diabetes mellitus.	81	4.4	0.88	0.080	120	120	10.7	Normoblastic erythropoiesis. Slightly hyperplastic.	Hyperplastic myelocytic system.
7	F	69	Cholelithiasis, Struma nodosa.	95	4.2	1.08	0.126	115-120-130-135-145-102	125	7.4	Normoblastic erythropoiesis. Good haemoglobinisation.	Hyperplastic myelocytic system. Left shift comprising the myeloblasts. Moderate left shift in the leucocytic series.
8	F	65	Vascular hypertension.	81	4.0	0.96	0.055	128	128	12.1	Normoblastic erythropoiesis. Good haemoglobinisation.	Hyperplastic partly macrocytic myelocytic system. Slight left shift in the leucocytic series.
9	F	70	Polyarthrititis. Anaemia.	78	3.7	1.0	0.103	125-150-100-135-125-110-150	128	9.3	Hyperplastic, normoblastic erythropoiesis, some macroproerythroblasts. Good haemoglobinisation.	Hyperplastic myelocytic system. Pronounced left shift comprising myeloblasts. Moderate left shift in the leucocytic series.
10	F	70	Obesity. Arthrosis.	88	4.4	0.95	—	120-155-136	137	13.0	Hyperplastic, normoblastic erythropoiesis. Haemoglobinisation slightly reduced.	Hyperplastic myelocytic system with left shift in the leucocytic row. Macrocytes in the peripheral blood.
11	F	67	Emaciation. Anaemia. Partial gastrectomy (Billroth I).	66	3.0	1.03	0.069	125-155	140	7.7	Hyperplastic, normoblastic erythropoiesis. Good haemoglobinisation.	Hyperplastic myelocytic system. Slight left shift in the leucocytic series.
12	F	50	Polyarthrititis. Anaemia.	62	3.7	0.80	0.027	185-120-120	142	16.7	Hyperplastic, normoblastic erythropoiesis. Sideropenic erythrocytes.	Hyperplastic myelocytic system. Slight left shift in the leucocytic series.
13	F	66	Myalgia. Psychoneurosis. Obesity.	78	3.6	1.03	0.112	165-138-135-160	150	16.8	Hyperplastic, normoblastic erythropoiesis. Some macroproerythroblasts. Good haemoglobinisation.	Strong left shift in the hyperplastic myelocytic system comprising myeloblasts. Slight left shift in the leucocytic series.
14	M	61	Partial gastrectomy (Billroth II).	86	4.05	1.05	0.048	155	155	16.0	Normoblastic erythropoiesis, representation within the normal range.	Reactive changes in the myelocytic system in the leucocytic series.
15	F	72	Polyarthrititis. Anaemia.	65	3.2	0.97	0.041	190	190	15.0	—	—
16	M	62	Congestive heart failure.	108	4.9	1.06	—	195	195	10.3	—	—

The Schilling test was carried out in principle in accordance with the original method (Schilling 1953). However, a lower dose — 0.5 μ g vitamin B₁₂ ("Merck") containing 0.1 μ C Co⁶⁰ — was given. By this method the urine excretion in normal persons per 24 hours is 10 to 38 per cent of the dose administered (6).

The sternal marrow contained no megaloblasts or promegaloblasts in any of the cases at first examination.

Some macroproerythroblasts were found in a few of the patients. In other cases the sternal marrow showed maturation disturbances in the granulocytopoiesis, which finding has been interpreted by some authors (*e. g.*, Bastrup Madsen 1956) as indicating deficiency of anti-megaloblastic factors.

Repeated sternal punctures were made before the Schilling test in a number of the patients after the elapse of a few months. This examination revealed partial megaloblastic erythropoiesis in patients Nos. 3, 4 and 7.

RESULTS

The results of the tests are shown in Table I.

The material can be divided into four groups according to the plasma B₁₂ values and absorption of vitamin B₁₂ from the gastro-intestinal tract, as estimated by the Schilling test.

Group A: Plasma B₁₂ value less than 100 μ g/ml and reduced absorption. The first 5 patients fall into this group.

Group B: Plasma B₁₂ value between 100 and 150 μ g/ml and reduced absorption. Patients Nos. 7, 9 and 11 come into this category.

Group C: Plasma B₁₂ value between 100 and 150 μ g/ml but, in contrast to the previous groups, absorption of B₁₂ within the normal range.

Patients Nos. 6, 8, 10 and 12 come into this group.

Group D: Plasma B₁₂ value between 150 and 200 μ g/ml and absorption of B₁₂ within the normal range. Patients Nos. 13, 14, 15 and 16 belong to this group.

DISCUSSION

The results in Group A suggest that plasma B₁₂ concentrations in the "pernicious range", less than 100 μ g/ml, indicate the presence of a perniciosiform condition in these patients, despite the fact that they have no clinical or significant haematological symptoms of B₁₂ deficiency. In addition, the tests show that such a condition in patients with achylia and normal eating habits is generally conditioned by gastrogenic factors. Only one of the patients in this group (No. 5) was probably suffering from an intestinal mal-absorption on account of chronic peritonitis, causing intestinal stricture and periodical subileus.

The reason why the plasma B₁₂ level can be so reduced without causing anaemia is unknown. The explanation may be that other anti-megaloblastic substances, such as folic acid, are able to

maintain the normal condition of the blood and bone marrow for a time, despite B₁₂ deficiency.

In addition, deficiency of other haemopoietic factors, primarily iron, sometimes seems able to mask the haematological signs of B₁₂ deficiency (4). Such combined iron and B₁₂ deficiency was found in at least one of the patients in the present material (No. 4), where the serum iron and colour index values were considerably reduced.

In only a few cases with plasma B₁₂ values between 100 and 150 μ g/ml was there definitely reduced absorption of vitamin (Group B). It is uncertain whether megaloblastic anaemia will develop in these patients. In the rest of the patients (Group C) the Schilling test showed normal conditions. However, it should be stated that all the values found in the patients in that group were near the lower limit of the normal range, which lies at 10 per cent excretion.

On the whole, the results would seem to show good correlation between plasma B₁₂ determination and the Schilling test. The demonstration of low plasma B₁₂ values which, as mentioned above, was taken as starting point for the further examination of the patients in this material, has in all cases been shown to be due to reduced or a low normal ability to absorb the vitamin.

Latent megaloblastic anaemia in patients with gastric achylia is presumably not an uncommon phenomenon. It is certainly of importance to be able to diagnose these cases, since it is in this group of patients that severe neurological damage may develop before anaemia occurs.

The aim of the present study has been to show how the plasma B₁₂ analysis can assist to this end.

It can be concluded that only plasma B₁₂ concentrations below 100 μ g/ml are with certainty indicative of a developing perniciosiform condition. Values from about 100 to 150 μ g/ml will give no definite information in this respect, but should be taken as an indication of the necessity for continued control of the plasma B₁₂ level and the bone marrow picture.

SUMMARY

Absorption of vitamin B₁₂ is examined in a group of patients with low plasma B₁₂ levels and histamin-refractory achylia but without megaloblastic erythropoiesis or clinical signs of vitamin B₁₂ deficiency. On the basis of these examinations, an evaluation is made of the significance of plasma-vitamin B₁₂ analysis for the diagnosis of such cases of latent megaloblastic anaemia.

References:

- 1) Bastrup-Madsen, P.: Acta Med. Scand. 1956, 154: 325.
- 2) Hoff-Jørgensen, E.: In Methods of biochemical analysis, ed. by Glick, Interscience Publishers 1954, vol. I p. 105.

- 3) Mollin, D. L. & G. I. M. Ross: Proc. Roy. Soc. Med. 1954, 47: 428.
4) Pedersen, J., J. Lund, A. Sjøborg Ohlsen & H. P. Østergaard Kristensen: Lancet 1957, 272: 448.
5) Schilling, R. F.: J. Lab. Clin. Med. 1953, 42: 860.
6) Schwartz, M., P. Lous & E. Meulengracht: Lancet 1957, 272: 751.

- 7) Østergaard Kristensen, H. P.: Nord. Med. 1956, 55: 85, and unpublished data.
8) Østergaard Kristensen, H. P. & A. Sjøborg Ohlsen: Ugeskr. Læger 1956, 118: 1228.
9) Wokes, F., J. Badenoch & H. M. Sinclair: Am. J. Clin. Nutrition 1955, 3: 375.

TRAUMATIC BLINDNESS IN DENMARK

By METTE WARBURG

Since 1858 free teaching at the Royal Institute for the Blind in Copenhagen has been available to all blind children in Denmark; there have been no other possibilities of education for the blind in this country until in 1898, when a separate school preparatory to the institute was established. Although compulsory school attendance for blind children was not prescribed by law until in 1926, it must be assumed that almost everybody who has become blind before the age of 16 years has been at the institute for a short term of years.

In 1878 medical records of the pupils commenced. To begin with, the examinations were short and, no doubt, comprised a random, though large, proportion of the pupils. From 1903 onwards all newly admitted pupils were examined by a specialist in ophthalmology. The statistical reports from the institute were commenced in 1879 by J. Moldenhawer (1), then head of the institute; he published a survey of the status of blindness in Denmark, based upon the diagnoses in his pupils through 20 years. This work was continued by the ophthalmologists E. Hansen in 1895 and G. Norrie in 1927. Since then statistical reports from the Institutes have been published every ten years.

It appears from these publications that the frequency of eye lesions causing blindness in Danish children since the middle of the last century has been about one fresh case per year.

The present series comprises all known cases of traumatically blinded persons examined by ophthalmologists in this country since 1878. In Table 1 the number of patients has been arranged according to the decade in which the trauma causing their blindness occurred. Thus it cannot be directly compared with Norrie's previously mentioned paper of 1927, in which he stated the causes of blindness he had observed himself during a 25-year period at the Institute for the Blind, as he did not include the cases he had taken over from his predecessor.

Table 1 shows that men and boys represent the great majority of the total number of patients,

From the Ophthalmologic Clinic of "De kgl. Blindeinstitutter" (Danish Institutes for the Blind), Copenhagen.

Head: H. Skydsgaard.

Table 1
Registered cases of traumatically blinded persons since 1878.

	Boys	Girls	Men	Women
Before 1900	13	1		
1900—19	16	5	1	
1920—39	13	2	16 (after 1933:12)	1
1940—56	6		28 (war:11)	2 (war:1)
	48	8	45	3

namely nearly half the cases each. Furthermore, it appears that the frequency among boys is falling, especially when the figures given in Table 1 are compared with those stated by Moldenhawer & Hansen, *i. e.*, about one fresh case per year. During the period examined there has been no essential change in the circumstances leading to the traumas in children, except for the fact that lesions caused during work and blindness caused by irresponsible conduct by adults do not occur in our century.

Table 2
Causes of Traumatic Blindness in Children.

	Play	Irresponsible conduct by adults	Work	Other causes	Cause unknown	Total
Boys	37	4	2	2	3	48
Girls	8					8

However, now as well as previously children's play is the most frequent cause. In the present as in other similar investigations (Boberg-Ans (4), Viggo Jensen (5), and Werner (6)) the traumas were caused during play with scissors, knives, forks, or arrows, or by explosions, accidental shots, corrosion, or burns.

The principal cause of blindness in children is sympathetic ophthalmia in the great majority of cases.

On the basis of the figures in Table 3, Fig. 1 shows the influence of sympathetic ophthalmia in children who have become blind owing to traumatic eye lesions. During the past 50 years sympathetic ophthalmia has had a significantly decreasing share in the underlying pathogenesis of the occurrence of traumatic blindness in child-

ren. The curve shows no sudden leaps owing to treatment with antibiotics or the hydrocortisone treatment that has come into use during most recent years; nor do the traumas seem to have changed their nature. Even though it does not appear from the case records, it is the general impression in this country that the patients seek medical advice earlier now than 30 to 50 years ago; and this must be assumed to be an essential cause of the decrease in number of cases of sympathetic ophthalmia.

Table 3
Frequency of Sympathetic Ophthalmia During the Period Examined.

	Boys Girls total		Boys Girls sympathetic ophthalmia	
Before 1900	13	1	10	1
1900—19	16	5	13	4
1920—39	13	2	9	2
1940—56	6	0	3	0
	48	8	35	7

Although the present study only comprises patients examined in connection with admission to public assistance for the blind, there is still a great difference with regard to their final vision in the best eye.

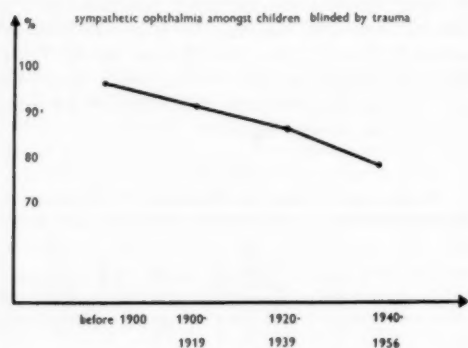


Fig. 1.

About one-third of the children who developed sympathetic ophthalmia and about half the children who were blinded by the trauma *per se* have no perception of light. More than half the children of the former category are able to perceive light as compared to only about one-fourth of the

latter group (see Table 4). Vision for finger-counting is present in relatively the same number in the two groups.

As will be seen from the following, the traumatically blinded children manage better than traumatically blinded adults, and this is due to the large group of patients with sympathetic ophthalmia. When this disease can be effectively counteracted, a possibility that is not improbable today, the number of traumatically blinded children will become very small, though the deleterious effects of the trauma will remain very great.

As already mentioned, the number of traumatically blinded children has shown a decreasing tendency in the present century. In contrast with this there is apparently a rise in the number of adult males (*cf.* the figures in Table 1); true, this should be taken *cum grano salis*, as the blind could not get disablement pension until from 1921 and, further, the social reform of 1933 afforded certain facilities for disabled persons. For the older who had become blind before 1921 there has hardly been any advantage in displaying their defect by application to the Institute for the Blind. Since 1914, however, there has been a possibility for the blind of obtaining public assistance without the effect of poor relief. The progress of technique, however, in the various places of work has undoubtedly also to some extent contributed towards increasing the number of traumatically blinding lesions; thus, before 1920 one case of such lesions was notified, but from 1920—39: seven cases, and from 1940—56: ten cases were notified.

Table 5 shows the age at which the blindness occurred in the adults as well as the type of lesion causing it. Even though the number of lesions per year is greatest among the young, the total number of notified lesions is most frequent among persons over 30 years of age; in addition to their recent blindness these people then have to struggle with the special difficulties of rehabilitation of elderly individuals. As shown in the table, the etiology is very polymorphous. Lesions during work are most frequent, amounting to 40 per cent of the total number of lesions. They were caused by explosions in 8 cases, in 3 by intraocular foreign bodies in both eyes, in 2 cases at intervals of years. Three persons were blinded by a large contusion from tools or burst-of parts of such, and 2 were kicked by a horse. The period

Table 4
Final Vision in Traumatically Blinded Children.

	Sympathetic ophthalmia		No sympathetic ophthalmia	
	Boys	Girls	Boys	Girls
No light-perception	10	5	6	
Light-perception without projection	15	2	3	
Light-perception→finger-counting	9	0	3	
Finger-counting→6/60				1
No data	1		1	

Table 5
Age, and Nature of Lesions.

	16-19 yrs.	20-29 yrs.	30-abt. 50 yrs.	total
Lesions during work	3	6	9	18
War lesions		5	6	11
Attempted suicide	1	2	3	6
Spare time occupation	4		1	5
Assault	1	1	1	3
Explosions (not during work)		1	1	2
	9	15	21	45

examined includes the special lesions of the time of the German occupation, all termed war lesions here, whether they were caused owing to the patient's participation in active service, acts of sabotage, or his more or less voluntary presence at such. Table 5 shows a total number of 11 of these lesions, or 25 per cent of the entire number of lesions; however, 5 out of these 11 patients were not Danish citizens at the time when the accident occurred; they have since obtained Danish citizenship. The war lesions that occurred in this country are thus few.

Lesions in conjunction with attempted suicide or other violent self-mutilation occurred in 6 cases. Most were temporal transverse-shot lesions causing injury to the optic nerves. The next group in Table 5 is that of accidents during spare time occupation; it comprises 5 cases caused by accidental shots, explosions owing to young people's play with chemicals, and one motor accident.

Table 6 a and b
Sympathetic Ophthalmia in Adults.

	Sympathetic ophthalmia		Sympathetic ophthalmia
Before 1920	1	16-19 years	3
1920-39	6	20-29 "	2
after 1940	1	30 "	3
a.		b.	

It is probable that the increased spare time of the population will cause a rise in the number of accidents in this group.

Table 6 shows the frequency of sympathetic ophthalmia in adults. As would be expected, it is much rarer than in children. The final vision in the adult patients mentioned here is given in Table 7. More than half the patients have no perception of light, and about one-third have perception of light but no projection of light.

Table 7
Final Vision in the Adult Patients.

	Men	Women
No light-perception	25	2
Light-perception, no projection of light ..	12	
Light-perception → finger-counting	2	
Finger-counting → 6/60	6	1

SUMMARY

A survey is given of the number of traumatically blinded during the past 50 years in Denmark and of the circumstances leading to the accident.

It is mentioned in particular that the number of traumatically blinded children is decreasing, and that sympathetic ophthalmia has a constantly falling influence in the pathogenesis.

After disablement pension and other measures of social relief for the blind have been introduced, there has been a great rise in the number of notified, traumatically blinded adult males. Whether there has been a rise in the actual number of traumatically blinded adult males, cannot be said on the basis of the present material.

References:

- 1) Moldenhawer, J.: Fremstilling af Blindhedsforholdene i Danmark. Copenhagen 1879.
- 2) Hansen, E.: De unge blinde i Danmark. Copenhagen 1895.
- 3) Norrie, G.: Causes of Blindness in Children. Acta Ophthalm. 1927, 5: 1.
- 4) Boberg-Ans, J. and K.-H. Sparup-Hansen: Ugeskr. Læger, 1955, 117: 669.
- 5) Jensen, V. A.: Ugeskr. Læger, 1941, 52: 1660.
- 6) Werner, S.: Acta Ophthalm., 1952, 30: 97.

THE RESULTS OF TREATMENT OF CANCER OF THE STOMACH

By J. BALSLEV JØRGENSEN

In recent years it has been disputed whether the results obtained by very extensive surgical intervention for malignant conditions are so radical that they justify the incapacity which these extensive interventions directly cause by the removal of organs of importance for the normal function of the organism.

Where cancer of the stomach is concerned, the question is to what extent the undoubted incapacity and excess primary mortality following total gastrectomy as compared with ordinary resection bear a reasonable relationship to the improvement of the final prognosis following the more extensive and more radical intervention.

To illustrate the problem, the results of treatment of cancer of the stomach in Department 1, The Municipal Hospital, Copenhagen, have been reviewed.

From Department I, The Municipal Hospital, Copenhagen.

Senior Surgeon: Professor Otto Mikkelsen.

The investigation concerns all patients suffering from cancer of the stomach who were admitted to Department I, The Municipal Hospital, during the years 1947—1951, inclusive. This five-year period was chosen because on follow-up investigation a minimum period of observation of 5 years is available and because in 1947 total trans-thoracic gastrectomy was introduced in the treatment of cancer of the stomach.

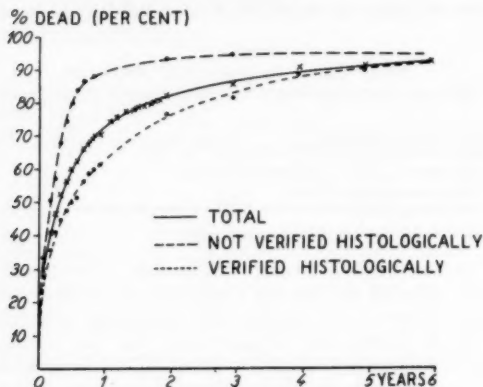


Fig. 1.
Distribution of Material.

The material comprizes 225 patients with cancer of the stomach. Of these, however, only 149 were confirmed histologically.

For evaluation of the material, summarized mortality graphs, such as Figure 1, are employed.

The ordinate in the figure shows the percentage of the entire material which died prior to the time indicated in the abscissa. The continuous line indicates the entire material and it will be observed that after 3 years a total of 80 per cent of all the patients had died while 90 per cent had died after 5 years. The two other curves in Figure 1 show the conditions for the histologically verified cases, separately. The graph for non-histologically verified cases is uppermost because the patients in poorest condition were in this group and many of them were clinically inoperable.

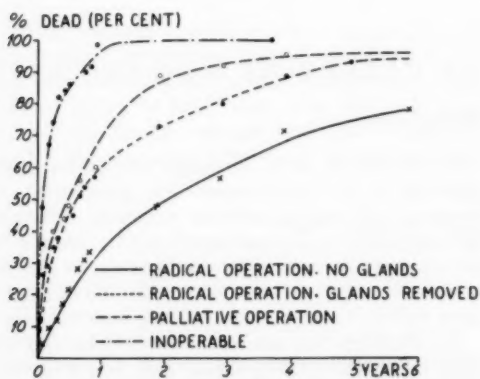


Fig. 2.
Extent of Intervention.

Figure 2 shows the material subdivided according to how radical the operation was.

The lowest curve shows the mortality for patients in whom radical operation was undertaken and in whom no glandular metastases were demonstrated either at operation or histologically. Even where these patients are concerned it will be observed that only 20 per cent survived after 5 years.

The dotted curve represents the patients who underwent radical operation and in whom affected glands were found and removed. The prognosis in these cases is distinctly poorer as only 5 per cent survived after 5 years. The interrupted line shows the mortality following palliative operation in which tumour tissue was left. It will be observed that there is only a slight difference between the last two curves. This observation probably indicates that when glandular metastases are found, the possibilities of radical operation are very limited even although all suspected glands are removed at operation.

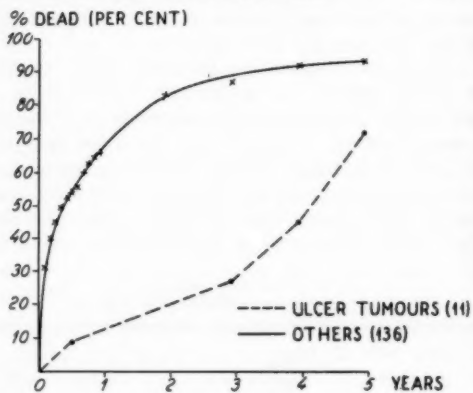


Fig. 3.
Ulcer Tumours.

The uppermost curve shows the mortality for the inoperable patients.

The material does not permit detailed subdivision into histological groups. Mortality curves similar to those described above show, however, that the prognosis for patients suffering from adenocarcinoma is slightly better than for patients with other forms of carcinomata.

In Figure 3 the ulcer tumours are compared with all the other forms of tumour classified together.

It will be observed that the prognosis for patients with ulcer tumours is better than for the other patients, particularly where the first years are concerned. After 5 years, however, the total mortality attains 70 per cent, *i. e.*, 30 per cent survival.

As has already been mentioned, the prognosis is very poor when glandular metastases are present and is only improved very slightly if these glands are removed "macroscopically". In order to determine whether the more extensive

removal of lymph glands in total transthoracic gastrectomy implies an improvement, the results following total gastrectomy are compared with the results following ordinary high resection.

Figure 4 shows such a comparison in patients who underwent radical operation and who did not present glandular metastases.

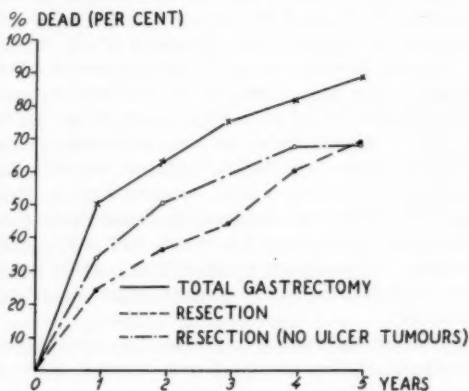


Fig. 4.

Total Gastrectomy and Resection on Patients who underwent Radical Operation and in whom Glandular Metastases were not Present.

It will be observed that the mortality curve following total gastrectomy is situated above the curve for resections in its entire course and that the survival rate after 5 years is 33 per cent for resection but only 13 per cent for total gastrectomy.

Figure 5 shows a corresponding investigation concerning those patients in whom glandular metastases were found but considered removed.

The difference between the curves is not great but the mortality following total gastrectomy is, at any rate, at no time less than that following resection.

It has been mentioned previously that ulcer tumours have a somewhat better prognosis than

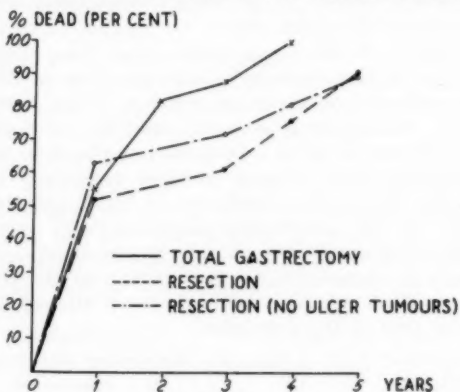


Fig. 5.

Total Gastrectomy and Resection in Patients with Glandular Metastases (Radical Operation).

the remaining cases, and as all the ulcer tumours occur in the group in which resection was undertaken, this might be supposed to give this group a false advantage. In addition to the curve for the total number of patients in whom resection was performed, the curve for patients with resection is, therefore, also recorded in the figure after exclusion of the patients with ulcer tumours. It will be seen that this curve also indicates a better prognosis than does the curve for patients with total gastrectomy.

The results of these investigations appear to be that it is only possible to improve the prognosis for patients suffering from cancer of the stomach by operation when no metastases are present in the lymph glands. Total gastrectomy neither improves the prognosis for patients with metastases in the lymph glands nor for patients without glandular metastases.

The last figure (Figure 6) illustrates the value of palliative resections compared with simple explorative interventions.

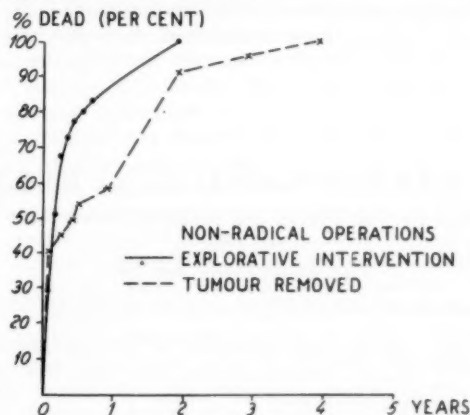


Fig. 6.

Palliative Operations.

No great difference exists between the curves and the final result is the same, *viz.*, 100 per cent mortality in both groups, but the mortality during the first years is, however, slightly less following palliative resections than following simple explorative interventions.

An attempt was made to obtain an impression of the post-operative condition of the patients who underwent palliative intervention. This proved, however, difficult as all of them are now dead. Out of the patients in whom resection was performed and who survived for more than 3 months after operation, the great majority enjoyed a free interval of relative good health. In some cases this interval lasted for up to 2 years. It thus appears that palliative resection may alleviate the condition in these patients for a certain time.

As regards the present material it may be objected that in a number of cases, presumably, total gastrectomy was carried out in patients with large tumours while resection was employed in

patients with small tumours. This, naturally, affects the gastrectomy group adversely but may be balanced, at any rate partially, by the fact that in a number of cases in which the palliative nature of the intervention was obvious, resection only was performed instead of the total gastrectomy planned.

The combined result of this investigation appears to be:

The substitution of resection by total gastrectomy scarcely improves the prognosis for patients suffering from cancer of the stomach (if resection is possible at all). This is probably due to the circumstance that it is very rarely possible to remove all the tumour tissue when the tumour has first begun to metastasize.

In the majority of patients with cancer of the stomach and, at any rate, in practically all the cases with metastases in the lymph glands, the surgeon should envisage the possibility of a palliative intervention and the intervention should be planned with this in view.

Finally, palliative resection may make the close of the lives of these patients more comfortable and prolong their lives by some good months.

A GERONTOLOGICAL SURVEY

THE DANISH NATIONAL MORBIDITY SURVEY OF 1950

COMMUNICATION NO. 14

By RICHARD FRIEDBERG and HENRY HAMTOFT

The purpose and methods of the morbidity survey and the hospital survey have been described in Communication No. 7 (1).

Both surveys are concerned with persons of the age of 15 and upwards; in the first-mentioned survey about 100,000 people, i. e. about 3 per cent of Denmark's adult population, were questioned, whereas in the second information was procured about 27,000 patients in medical and surgical departments, i. e. about 10 per cent of the adult patients admitted annually to these departments.

As many problems connected with the higher age groups in several countries, including Denmark, are awaiting their solution, it was a natural desire in these surveys to pay particular attention to the health and social particulars of the elderly, i. e. persons of from 60 years upwards. Of the 100,000 interviewed in the morbidity survey, about 16,000 are 60 years or older, and of the 27,000 in the hospital survey about 7,000 are in that group. As the selection was made representatively (see Communication No. 6 on selection), these two surveys make it possible to express opinions on a number of problems concerning the

health of the population etc., and the problems of the elderly can be analyzed from a material in which young and old were questioned in the same manner irrespective of their ages.

In addition, however, it was also desired to throw some light upon a number of problems of particular interest as regards the higher age groups. This was achieved by asking special questions of about 3,000 persons in the age group 60 and over (about 5 per thousand of all persons in that age group) during a certain period. These persons were also included in the general morbidity survey, i. e., they form part of the 16,000 people of 60 years or more who were interviewed in their homes (including old-age homes). The questions were specially centred upon these people's ability to look after themselves, their daily food, their housing, work and wages, also problems concerning their contact with family and friends and their "spare time" activities (hobbies).

In addition to the answers to the general questions of the survey the following information was secured:

On ability, information was obtained as to whether the persons can look after themselves, whether they are wholly or partly helpless, whether they are bedridden or not, and so on.

On food, they were asked who prepares their food, the composition of their diet and whether meals are taken regularly or not.

The questions concerning housing comprised the kind of dwelling (own home, hired apartment, room, institution, conveniences etc.).

As to work and wages, the point was whether these old people have paid occupations, how many daily hours they work if any, etc.; if they were out of employment they were asked why they stopped working, whether or not they wished to start again if they got the chance, if they were well enough to do so, etc.

Regarding their contact with family and friends we have ascertained whether there is personal contact or to what extent their only contact is by letter, etc.

Finally, the 3,000 were asked about their spare-time activities (hobbies), including their interest in reading, listening to the wireless, doing handiwork, taking part in club life, going to church etc.

Together with the information acquired by the morbidity and hospital surveys regarding the health and social conditions of the population, these special particulars should serve to reveal the living conditions of elderly people in Denmark by demonstrating that section of the problems that are especially characteristic of the older part of the population.

Reference:

Lindhardt, M. & R. Friedberg: The Danish National Morbidity Survey of 1950. Communication No. 7. Dan. Med. Bull., 1955, 2: 148.

From the Committee on the Morbidity Survey.
Chairman: Johs. Frandsen.

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